RAILROAD GAZETTE

FRIDAY. DEC. 4.

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Contributions.

The Illinois Central Belpaire Boiler.

Norfolk and Western Railroad Co.,
ROANOKE, VA., Nov. 24, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of the 20th inst., on page 813, you show drawings of a large Belpaire boiler for the Illinois Central R. R. Having had considerable experience with boilers of this pattern, I take the liberty of making a few criticisms.

The gusset braces between back head and top flat sheet are, I think, of very poor construction, and believe that it would have been much better to have carried a straight rod from the front flue sheet to the back head in between the second and third rows of cross stays over the firebox, the weight of which rods could be carried by suspension hangers from the shell on both sides of the dome. One of the beauties of the Belpaire construction is that as the inner firebox rises, when the boiler is being fired up and the outer sheet is still cold, the flat upper surface goes up with the crown sheet, but with this plate style of bracing, this movement can only occur at the front end of the firebox, and I should look for leaky crown stays about the 14th or 15th row from the front, after the engines have been in service for a while.

A series of direct stay rods from front to back sheet would certainly have been cheaper and would also have done away with the necessity of using the angled rods from the front flue sheet to the shell. The feet of these braces where they are fastened to the shell are always put on to the rods with an offset, which is a weak construction, and if the rod is strained to anything like the proper working tension, this offset will straighten out and allow the flue sheet to bulge forward slightly, which I believe to be a very frequent cause of leaky tee head and steam pipe joints, in addition to which the strain on the direct stay rods can be accurately calculated; but when the elements of expansion and contraction are introduced into the calculation for the gusset platesand the sheets to which they are attached, it would be a very difficult matter to know what the strains on these amount to. The throat stay brace, shown in the drawing, has also proved to us to be very unsatisfactory. These throat stay braces were at first a constant source of annoyance, until we took to making them hinged, to allow for a slight movement in a vertical direction between the firebox and waist sheet, since which change all trouble with these throat stay braces has disappeared. The crown bolts are shown with heads on the under side of crown sheet and riveted over on the outside. I really believe it is better construction to put nuts with a grummet and washer under each nut on the outside end of these crown bolts rather than to rivet them. It is exceedingly difficult and requires very accurate workmanship to make a joint both on the taper thread next to the head on these crown bolts and on the face of the head simultaneously, and whether this joint is steam-tight on the thread at the face of the head or at both places, the hammering over of the top ends and holding up underneath is exceedingly liable to jar the joint loose; besides which, if when testing the boiler previous to putting it in service, leaks are found in these crown bolts after the riveting over has been done, it is impossible to tighten them up by the use of a wrench, but if the upper end is not hammered over, an extra part of a turn with a long wrench will make them tight without the necessity of using a calking tool, which, when unskillfully handled, generally results in making the thread loose in the hole.

Experience has shown us also that even for a coal that is not noted for smoke or long flame, better results are obtained by sacrificing some of the heating surface in the tubes and using 2¼ or 2½-in. flues instead of 2-in. The flame is then not extinguished in the flue, as is the case with 2-in. flues, and the gases are burned in the flues instead of passing in a choked-out condition into the smokebox, losing a considerable portion of their heating efficiency.

R. P. C. SANDERSON, *Div. Supt. M. P.*

Safety in Car Coupling.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In a letter on coupler unlocking devices in your issue of Nov. 27, it was said that I had assumed that the upper lock lifting device, common to six of the couplers now in use, would be adopted as the standard, and I still believe it will be the one generally used, not only from its convenience and simplicity, but from its small cost and the facility with which it can be repaired. Although some of the brackets which hold the rods are peculiar, yet I do not think there is one of the six on which an ordinary wrought-iron bracket could not be used, whereas all of the under unlocking devices require a special bracket which cannot be forged readily, and it would be necessary to send to the manufacturer, or else keep them in stock along the line of all the railroads, whether they used that style of coupler or not; but time and practice alone will settle this matter.

The letter of Nov. 27 refers more particularly to a coupler whose knuckle can be pushed open from the side of the car with the lifting rod. As it goes without saying that a brakeman would open the knuckles in the easiest manner, he would not exert so much force as would be required to push the knuckle open, but would step between the cars and open the knuckle by hand, as is done now, whether it is legal or not. The law would be observed the same as the law requiring the use of a stick to guide the link, which has been more honored in the breach than the observance.

The fact is, the coupler used should be strictly automatic, like the Miller hook, but as it is impossible to use a coupler of the Miller type on freight cars, the next best thing to do is to use some method by which the knuckle of the M. C. B. type of coupler would open automatically by merely lifting the lock (which requires no special exertion) at the side of the car with the lifting rod. This has been accomplished quite well in the Van Dorstan coupler, only it has an under unlocking device which the writer considers objectionable.

The fact is, though, that as long as there are a greater number of cars equipped with the link-and-pin couplers it will be necessary to go between the cars more frequently to close the knuckle than to open it, and when most or all of the cars have the M. C. B. type on, in uncoupling one knuckle is always left open, and the occasions will be rare when the brakeman will have to go between the cars for that purpose, and when he does so it is not like coupling with the link, which is so dangerous now, as he does not have to stand and hold the knuckle, and will always have plenty of time toopen the knuckle and step out of the way before the cars are backed up to be coupled.

If the brakemen and switchmen who complain so much about coupling the new style to the old, being more dangerous than two of the old style, would push the link in the mouth of the drawhead of the hook coupler (in at least two or three of those in use) they will find that it would not be necessary in most cases to guide the link at all, as it would be held out straight, and by setting the pin, as is customary, in the common drawhead, it would couple automatically, and thus prevent many accidents.

T. L. MCKEEN.

Red Tail-Lights and Rear Collisions.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The best way to protect the rear end of trains, both while running and when standing still, is a serious question in the safe moving of trains, and one more difficult of solution than "rates." When an accident occurs the much abused brakeman comes in for all the blame; he is always accused of not going back the required distance to flag. In some cases he is undoubtedly at fault, but one who searches closely for the causes of the numerous rear collisions throughout the country will find that there is a greater source of danger than the negligence of the brakeman. A rear end collision during the day is seldom heard of, even on roads that are very crooked. The night time, when lights are depended upon, is when the trouble comes. A study of the signal rules of almost any road, and of the method of moving trains during the night, will show that one of the principal sources of trouble is in the signal rules, which read as follows: Red, danger, stop immediately; green, caution, reduce speed; white, safety, go ahead. This is inconsistent with practice. When a switch is turned, leading from the main to a side track, a red light is shown; if the enginemen obeys the rule relative to the meaning of colors, he would not pass this signal, as it tells him to stop, but of course he disregards the color and pulls by. On the rear of each train during the night will be found from two to four red lights, as a *protection*, so any superintendent will tell you. A glance at the way trains are moved on any of the large railroads will show that protection of this kind, unlike the McKinley Bill, does not protect, but is a source of danger for the reason that red is used in so many cases where it does not mean "danger, stop." It is not an unusual sight to see eight or ten freight trains follow each other from one to two miles apart all night at full speed, with the red lights of the preceding train in plain sight of the following engineman, he never reducing speed until a motion signal is given by the train ahead to do so. If the meaning of the red color were strictly observed, a following train in such cases would stop when it came in sight of the lights of the train ahead; but the men have become so accustomed to following red lights that they keep on running, not being sure that the train ahead is or is not slackening its speed, and waiting for the flagman of the train ahead to signal them to stop. This they do until it is too late, and a collision results. The cause given is, "flagman failed to go back in time."

Red lights are so common that enginemen and trainmen do not look upon them as meaning *stop!* in every case; herein lies a great danger. A case recently occurred in which a train ran into the one ahead, where the engineman of the following train could see the red lights of the train ahead for a mile and a half. He stated that he thought the train ahead was moving, and waited for a signal from it to stop, but this was given too late.

To avoid misunderstanding of this kind the use of signal colors should be changed so as to be consistent with the established rules. When a switch is turned from a main track to a siding for a train to enter, red should not be used, for it is a stop color. Green, which means caution, reduce speed, should be used. When a train is running at its usual speed there is no danger of a rear-end collision, and green is the appropriate color to use, because it means caution, reduce speed, to a following train, and is just what a following train should do when it comes in sight of tail signals. When a train commences to reduce speed for any reason the green lights should be changed to red and that color should be displayed until the train has resumed its usual speed. With this system of using colors, an engineman following another train would know just how to handle his train. If green were displayed, he would know that the train ahead was running at its usual rate of speed; if red were shown, he would know that the train ahead was either standing still, starting or stopping, and would immediately get his own train under control. When a train takes a siding and clears the main line, the rear lights should be changed to white instead of to green. It is certainly inconsistent to display a cautionary signal to a following train when the main line is perfectly clear.

This plan of using colors would reduce the number of red lights now seen, and increase the value of those displayed, and would mean danger in earnest to an engineman.

I do not recommend this change in the use of colors to relieve the flagman in any way; he should go back and flag in all cases where the rules require it. The change is suggested as a help to him in the protection of his train, and to bring about a more consistent use of signal colors.

A.

The Morison Tower for the Columbian World's Fair.

In a recent issue we published a very short preliminary description of this structure. We are now able to give drawings and an authoritative description in detail. The building of the tower seems to be as well assured as the holding of the Fair itself.

General Description.—The general arrangement of the tower and of the accommodations is modeled from the Eiffel tower at Paris. The base of the tower is made approximately two-fifths of the height. Two hundred feet above the base is the first platform, to be occupied by promenades, restaurants and miscellaneous accommodations, being high enough to command the best view of the entire grounds and buildings. The second platform is 200 ft. higher up than the first, and is to be used in a manner somewhat like the lower platform. Five hundred feet higher up is the lantern, which is the principal point for distant views, and is surmounted by a lighthouse and flagstaff, which together have a height of 165 ft.

While, however, the general arrangement is derived from that of the Eiffel tower, the system of construction is necessarily of a very different character. The problem to be solved was to design a tower to be carried on the soft soil on which the city of Chicago is built, this soil being a fine sand which carrries large weights perfectly well when they are properly distributed or supported, but has little power in itself to resist lateral thrusts. This renders anything like the inclined supports of the Paris tower inadmissible, and, further, makes it necessary to provide for the expansion of the metal of the tower in a manner which would not strain the foundations. Besides these considerations of foundations, it was also necessary to design a tower which can be built in the shortest possible time and erected with a maximum speed. This made it necessary to confine the construction to right lines and square angles. This led to the selection of the plan adopted.

The upper shaft from the lantern down to the second platform is square battering from 40 ft. square at the top to 100 ft. square at the base, the entire weight being carried by the four corner posts, which are stiffened by

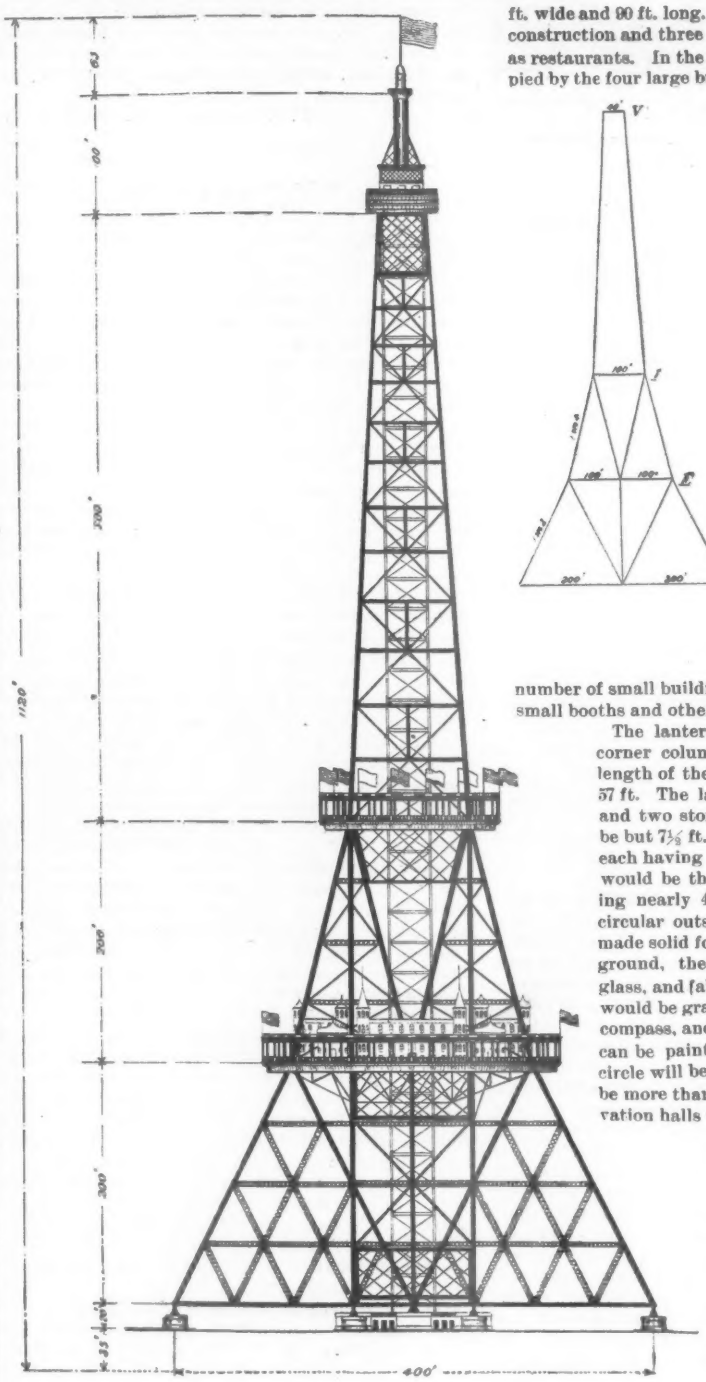
bracing in each of the four planes. The details are of much the same character as those of the high towers of an iron viaduct. It is the simplest possible form of construction as well as the strongest and most easily erected.

From the second platform to the first each of the four sides of the upper shaft is continued downward in a vertical plane, the four planes intersecting each other on vertical lines 100 ft. apart. Each of the four corner posts is therefore over one of the intersection lines of the planes and the weight from each of the corner posts is distributed on four posts, two in each plane, these posts battering from each other with an inclination of one in four. The section of the tower therefore between the first and second platforms consists of 16 posts, of which four are in each of the four planes, the interior posts coming together at the base; and the arrangement of the four posts being like an inverted W, 200 ft. high and 200 ft. wide. The shape, therefore, of the tower at the level of the first platform is cruciform, measuring 200 ft. in each direction and 100 ft. across each arm. The posts are braced together at intervals of 50 ft. in the four planes.

Below the first platform the weight from the eight interior posts is carried directly to the foundation by vertical posts, while the weight from the exterior posts is carried down on the same principle that the weight from the four posts of the upper shaft is carried, that is, by two equally inclined posts from each point. To bring these posts together at the centre it was necessary to double the batter, making it one in two, instead of one in four. Each plane therefore of the lower 200 ft. of the tower becomes an inverted W, 200 ft. high and 400 ft. wide on the base, with a vertical member in the centre. The members of this plane are stiffened by bracing placed every 50 feet. The base of the tower is then of cruciform section, each arm being 400 ft. long and 100 ft. wide. The weights of the lantern and the several platforms are provided for at their several levels.

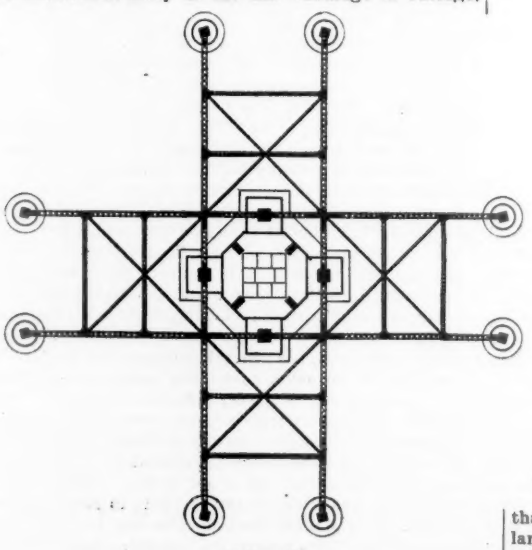
With this arrangement more than half the total weight of the tower is carried on four central points and is a fixed quantity. The remainder is carried on eight outlying piers and varies with the wind pressure. The live load is distributed in the same way, but of course is a variable everywhere. The four central points of support are made fixed points and rest on piers which are united in one great foundation. The bearings on the outlying points are all made with expansion links which are able to resist both tension and compression, and the lines of motion of these links are made radial to the centre of the tower so that the expansion of the metal both longitudinally and transversely is provided for at the same time. The only expansion not provided for is that due to different temperatures in different parts of the lower horizontal plane, which is so small that it may be neglected. The entire structure is tied across the base and is complete in itself, the only stress transferred to the foundation being a vertical pressure.

The maximum weight thrown by the tower with a complete estimated live load on each of the four central points is 1,760 tons, or, in round numbers, 7,000 tons on the whole foundation, and the maximum weight thrown on each of the eight outlying piers is 880 tons, this, however, being largely due to wind; the dead load alone thrown upon each of these piers is less than 300 tons. If these weights are compared with the weights on the foundations of many of the tall buildings in Chicago,

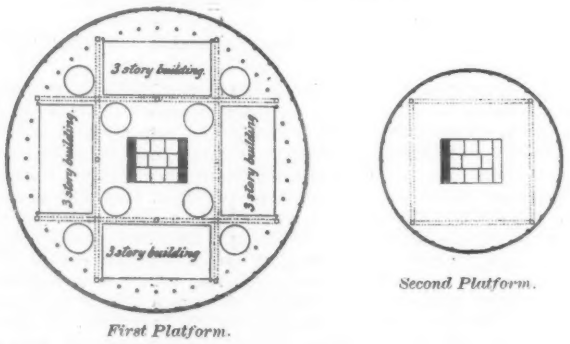


Scale.

The Morison Tower—Columbian World's Fair.



Bottom Plane.



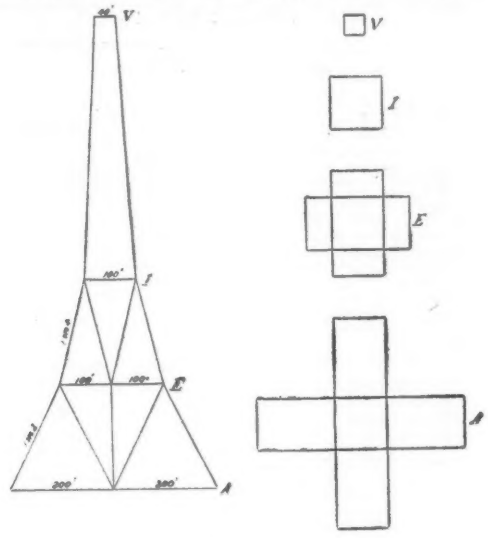
First Platform.

Second Platform.

Cross-Sections.

and especially under the grain elevators, which are the heaviest and oldest structures in the city, it will be seen that in spite of the immense size of the tower, the foundations are a comparatively simple problem. The weight of the structural portions of the tower above the masonry foundations is about 7,000 tons. To this is to be added 2,000 tons for the weights of floors and buildings, and 2,000 tons more for live load, making a total weight of 11,000 tons, of which less than one-fifth is variable. A grain elevator of 1,000,000 bushels capacity, and there are much larger elevators than this in Chicago, weighs, when full of grain, at least 50,000 tons, of which more than one-half is variable, besides which it exposes a large, flat surface to the wind, and, in all respects, is subject to much greater disturbing elements than the tower.

Accommodations.—The accommodations, though following the same general arrangement, have been materially increased from those of the Eiffel tower. The first platform is 250 ft. in diameter. Around this platform runs a covered colonnade 15 ft. wide, which forms a continuous promenade unbroken by angles or any local features to check the movements of a crowd. Inside of the circular promenade the platform is left uncovered, except where occupied by buildings. The spaces between the colonnade and the planes in which the structural members are, give room for four large buildings 45 ft. wide and 90 ft. long. These buildings will be of light construction and three stories high and will be occupied as restaurants. In the interior, besides the space occupied by the four large buildings, there will be room for a



Skeletons.

number of small buildings to be occupied by various small booths and other buildings.

The lantern will be supported on the four corner columns, which are 40 ft. apart, the length of the diagonal being therefore about 57 ft. The lantern is made 60 ft. in diameter and two stories high, each story, however, to be but 7½ ft. high. This will give two rooms, each having a circumference of 188 ft., which would be the lookouts of the tower, thus giving nearly 400 ft. of observation wall. The circular outside wall of each floor would be made solid for a height of about 3 ft. from the ground, the next 3½ ft. will be of plate glass, and above this will be a frieze, which would be graduated to mark the points of the compass, and the names of important places can be painted in the proper directions; this circle will be of such size that each degree will be more than 6 in. long. Above the two observation halls will be an open gallery, to which the public will not be admitted, but on which a small circular railroad can be laid on which a powerful electric light can travel so as to make variable effects of colored light, while within this track will be a smaller building containing rooms for special purposes.

Above this small building a round shaft made of boiler plate 12 ft. in diameter will extend 60 ft. This shaft will contain a spiral staircase leading to the highest platform of the tower 1,020 ft. above the graded surface of the ground. Above this platform will be a lighthouse surmounted by a flagstaff, the total height from the ground to the top of the flagstaff being 1,085 ft., and from the bottom of the foundation to the top of the flagstaff 1,120 ft.

Within the main structure is to be built a secondary structure 36 ft. square and of uniform size throughout, extending from the foundation to the lantern. This structure is to hold the elevators. It is divided into nine shafts of approximately equal size, eight of which will be occupied by the elevator cars, and the ninth at the centre will hold the machinery. Each elevator car will have an area of 100 square feet and be capable of carrying 50 people.

CONSTRUCTION.

Foundations.—The foundation work will comprise eight outlying piers supporting the exterior bearings of the tower, and the central pier which supports the centre bearing. The general principle adopted for these foundations is that of concrete piers resting on piles. The weight per pile will be limited to from 10 to 15 tons according to observations to be made when work is actually begun. These weights are without any allowance for the bearing on the ground surface between the piles. If the piles were entirely omitted the weight on the surface would be from 1¼ to 1¾ tons per square foot.

The concrete foundation will begin 2 ft. below mean water in Lake Michigan, and the piles would extend up

3 ft. into the matrix of concrete. All concrete will be first class Portland cement concrete. The central pier will contain 7,500 yards of concrete and be supported on 1,600 piles. Each of the outlying piers will contain 700 cubic yards of concrete and be supported by 185 piles.

Above the concrete foundation, which will be about level with the graded surface of the ground, will be built separate piers, one on each of the outlying foundations and four on the central foundation. These piers will be of limestone with heartings of Portland cement concrete, the piers on the central foundation being 30 ft. square and 14 ft. high, and those on each of the outlying foundations 20 ft. in diameter and 11 ft. high. The total amount of masonry and concrete in all the foundations is somewhat more than 15,000 cubic yards.

Structural Metal.—The tower will be built of mild steel and of wrought iron, wrought iron being used only in the lighter members. The principal columns are of square box section, fitted with man holes and interior ladders for purposes of inspection and convenience of workmen. These columns below the second platform will be 40 ins. square and above the second platform they will taper, decreasing from 40 ins. at the base to 16 ins. at the lantern. All the interior columns will be built of plates and angles with open laced sides. All bracing and stiffening members will have riveted connections so that nothing can get loose; the compression members are generally square, made of four angles at the corners and with all four sides laced; the tension members are made of four bulb angles placed in pairs back to back with a single line of lacing.

The weights on all the floors are taken at 100 lbs. per square foot, of which one half is treated as live load. The weights of the tower used in the calculations are the actual weights of the metal. A wind pressure of 50 lbs. per square foot on the entire structure is provided for, and a wind pressure of 80 lbs. per square foot on the lantern is provided for in all members above the second platform.

With these conditions the strains are limited to 14,000 lbs. per square inch on square box columns, with a maximum unsupported length of 16 times the width, and these strains are reduced for longer columns, or when thin metal is used in the plates. Where any member is subject to both tension and compression the sum of the two strains is used in determining the section.

The interior elevator shaft will be of the same character of material, and will rest directly on the central foundation.

The entire structure will be incombustible, the floors of the platforms being covered with asphalt or cement concrete, and no wood being used anywhere for structural purposes.

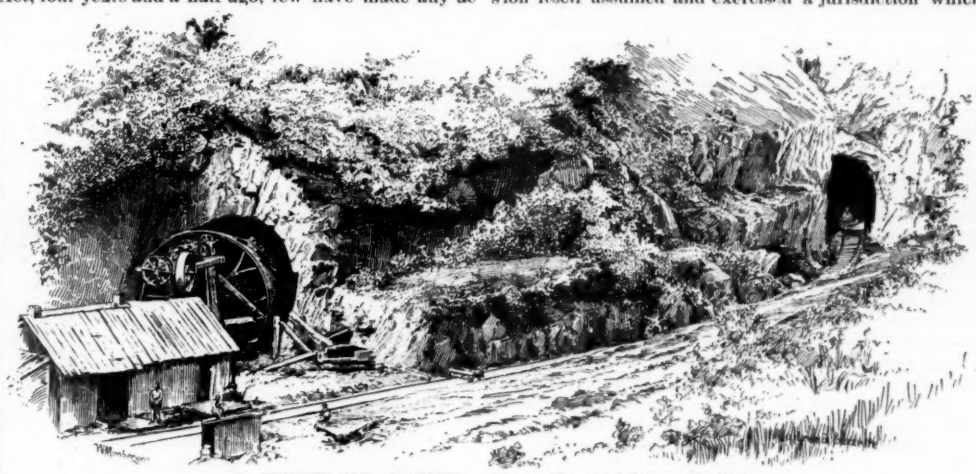
The Great Hoosac Tunnel Bore.

BY THEODORE COOPER.

In 1851 a boring machine was built at South Boston to pierce the Hoosac Mountain. It was designed to cut out a groove around the circumference of the tunnel 13 in. wide and 24 ft. in diameter, by means of a revolving disk with cutters on the edge. It was designed and patented by a mechanical engineer named Wilson. In 1853 Mr. A. F. Edwards, the first engineer in charge of the tunnel, said, "The result of its workings in the natural rock, under every disadvantage, in the different experiments has been from 14 to 24 in. forward per hour on a full circle of 24 ft. diameter; exceeding the expectations of its most sanguine friends, and bidding fair to revolutionize the whole system of railroad building." He then makes a very careful and moderate estimate, counting only two-thirds of what the machine has actually done as a fair rate of progress, and shows that the entire excavation for the whole tunnel could be completed in 1,005 days, "presenting a hammered-faced surface upon each and every side."

Gen. Hermann Haupt writes that, "in 1855, while holding the position of Chief Engineer of the Pennsylvania Railroad, I was asked to give an opinion as to the practicability and cost of tunneling the Hoosac, by parties who had been solicited to advance capital to the contractors, at that time Edward W. Sewell, of New York, and Wm. A. Galbraith, of Erie, Pa. I visited the work in the winter of 1855-6, and found at the east side of the tunnel a large machine, which had been started in 1854 to bore into the state treasury, to secure a loan of credit of two million dollars, but had never done any other work. When I became interested in the work on 1856 the 'great bore,' as it was then called, had penetrated only about 30 ft., and had then been abandoned. The unmanageable size of this machine had induced the contractors, E. W. Sewell & Co., to order a smaller one in a different plan, which was constructed at the Novelty Iron Works, in New York, and which, after my connection with the contract, I had the privilege of paying some $25,000 for, but never used. This second machine was designed to cut a complete circle 8 ft. in diameter having no core. I had no faith in such machines, and turned my attention to the construction of a simple pneumatic drill for making holes in which to insert explosives. This drill was developed to a point where a penetration of 2 to 3 in. per minute could be made in hard granite, and was far ahead of the Mont Cenis or any other drill at that time, but by no means perfect."

In the summer of 1861, after Haupt & Co. had stopped work upon the tunnel and railroad, Mr. Popkins, a photograp of Greenfield, Mass., and Messrs. Rice and Cooper, assistant engineers on the above work, formed a joint stock company to go into the mountains to take views, fish, etc. They were met at the foot of the mountain by a severe storm which destroyed all of their plans. On their return, at the request of the writer, advantage was taken of a few minutes' cessation of the rain to take a view of the great bore. The accompanying picture is a very good reproduction of this photograph. The great bore is seen to the left, and the mouth of the existing tunnel to the right of the picture.



A TUNNELING MACHINE AT THE HOOSAC TUNNEL.

Recent Railroad Legislation and Its Effects Upon the Finances of the Country.*

BY PROF. ARTHUR T. HADLEY.

. . . I need hardly remind you of the importance of this question to the financier. A fall of one half of one per cent. in the return on railroad securities in the United States represents almost as much as one year's product of silver; the loss in capital valuation attending such a fall is more than one year's product of wheat and cotton put together. Railroad securities represent a vastly larger class of investment than any other—perhaps than all others put together; and anything which affects their price, affects the whole financial world.

Everyone knows that railroad property has fallen in value since the passage of the Interstate Commerce Act, four years and a half ago; few have made any accurate estimate of the amount of that fall. Let us take the stocks of the leading railroad systems immediately west of Chicago, as a type. Here we find an aggregate shrinkage of over $60,000,000, or more than one quarter of the par value of the stocks.

		Price— Ap. 4, '87.	Nov. 4, '91.	
	Par value.			S'rink'ge.
Chic., Milwaukee & St. Paul..	$30,904,261	93	75	$5,560,000
" " " pref..	21,555,900	122	119	647,000
Chic. & Northwestern.....	51,365,900	121	116	1,568,000
" " pref ...	22,325,454	148	139	2,009,000
Chic., Rock Island & Pacific...	41,960,000	126	82	18,462,000
Chic., Burlington & Quincy...	77,540,500	140	98	32,567,000
	$225,651,000			$60,815,000

Had we chosen to extend our examination to the systems further west, the same result would have appeared in even more striking manner; for, though the northern lines have held their own, the Union Pacific, Missouri Pacific, and Atchison show losses greater that the roads in our table.

It is not the amount of this shrinkage, but the conditions which have attended it, that should furnish occasion for remark. The loss itself is far from being unprecedented. It was probably equaled in the crisis of 1885; it certainly was in that of 1873. The strange fact is that it has occurred without any corresponding depression in trade. In 1873 and 1885 the value of railroads fell along with the values of everything else. The years of railroad depression were years of general depression in trade; years of labor troubles, of inactive business, of widespread distress among all classes. But the present depression is peculiar to railroads. It comes in the midst of normal business conditions, good crops and as much freedom from labor troubles as we can usually hope to attain. It is not even shared by other securities which appear side by side with railroads on the lists of the stock exchanges. Telegraph, steamship and express companies have had no part in it. Nor is it shared by foreign railroad systems. In the years following 1873 or 1884, railroad business was depressed in other countries as well as in the United States; showing that the loss was traceable to general conditions of trade, wider than was reached by the statutes of any single country. But the years 1889 and 1890 are years of prosperity in England, France and Germany. Even on our own border, the finances of the Canadian Pacific are flourishing while those of our own roads are suffering.

Even in our own country those railroad companies which are so fortunate as to be large coal mine owners have furnished some brilliant exceptions to the fall in price among railroad securities themselves. And among railroads pure and simple, the years 1887-1891 have been years of prosperity in those districts which were not specially exposed to reckless legislation.†

Nor can the fall in price be attributed except in a small degree to the management of the railroads themselves. The systems which we have chosen as a text were well established and in general well handled. It is the fashion in certain quarters to attribute the loss to reckless over-construction. Yet the railroad construction in the last four years, in the districts we are considering has been no more rapid than in the years immediately preceding.

MILES IN OPERATION.

	1882.	1886.	1890.
Central Northern.....	34,236	43,069	50,936
Northwestern..... ..	6,962	12,330	20,859
Southwestern	13,962	20,257	28,356
Total.....	55,160	75,656	100,131

Even the reduction in rates, as will presently appear, has been no more rapid in recent years than it was previously.

If the decline in value is not to be explained either by the general conditions of trade or by the special conditions of railroad development we are justified in attributing a large part of it to the results of legislation.

When the Interstate Commerce Act was passed in the beginning of 1887 it was generally supposed to be, for the moment, the end of the efforts toward more general legislative control. It proved to be but the beginning.

In the first place the Interstate Commerce Commission itself assumed and exercised a jurisdiction which no one had anticipated. Where the statute itself was obscure or contradictory the Commission undertook to interpret it, and, in so doing, created a large body of transportation law with unprecedented rapidity. The principles laid down by the Commission were such as to merit general approval, but it too often overlooked the fact that the means for enforcing these principles, whether by the court or by the railroad authorities, were wholly inadequate; that the law itself had taken away the best means which had hitherto existed, and that under such circumstances the burden of new duties, suddenly imposed, must be destructive rather than wisely conservative.

In the second place, the Legislatures of the several States, stimulated by the example of Congress, hastened to pass laws in imitation of the Interstate Commerce Act, which in many instances went far beyond their model in point of stringency. Railroad laws were passed by the legislatures of Iowa, Maryland, Minnesota and South Carolina, in 1887-8, of Florida in 1888-9, and of no less than thirteen States in 1889-90, viz., Georgia, Iowa, Kentucky, Massachusetts, Mississippi, New Hampshire, New Jersey, North Dakota, Ohio, Rhode Island South Dakota, Virginia, Wyoming; not to speak of the recently adopted Constitution of Kentucky. The legislation of 1890-91 shows a slight reaction against the movement of the three years previous.

In two respects the State Legislatures went quite beyond the scope of the Interstate Commerce Act. They tried to prescribe safety appliances to the operating department and rates to the traffic department. Of the first of these efforts little need be said, except that as a rule it has failed to accomplish any great progress toward the result in view, and has in some instances actually hindered such progress. The attempt at prescribing rates was more serious. It involved a return to the methods of the granger legislation fifteen years earlier, which had operated so disastrously upon the railroads and the public alike. The system of commissioners with power to make schedules, which should be at least *prima facie* evidence of reasonable rates, had during the intervening period never been wholly abandoned; but the powers thus conferred had been sparingly exercised. It was either left unused, as was generally the case in the North from 1877 to 1887; or the schedule rates were put high enough not to interfere with a good railroad economy, of which examples are seen in Georgia and other parts of the South. But from the year 1887 onward, there was a pressure upon the commissioners to make schedules, and to make them low; and—lest these boards should not be able to reflect the popular feeling directly enough—they were in some instances, no longer to be appointed by the governor, but elected by popular vote. The law which was most severely applied, and attracted most public attention,

* An address delivered before the American Bankers' Association at New Orleans, Nov. 11, 1891.

† See Appendix A.

was that of Iowa. The proceedings of the Minnesota Commission received a pretty sharp check from the United States courts; while the Nebraska Commission, from which much was feared, has used its powers with moderation.

But the attempt to prescribe rates, though it was the most radical feature of railroad legislation, has not been the most serious one.

The prohibition of pools has done the railroads ten times more harm than the prescription of rates. There is no time to discuss the questions of railroad economics here involved. Suffice it to say that the majority of men who have studied the subject believe that uncontrolled competition inevitably leads to discrimination; that a good system of division of traffic is an essential means to secure economy in operation, and to avoid fluctuations in rates which are quite as ruinous to the shippers as to the railroads; that the courts had gradually receded from their position of hostility to such arrangements, and were coming to regard them as a valuable auxiliary in preventing discrimination; and that the railroads had succeeded in making agreements of this kind which, though far from perfect, actually did away with many of the worst evils under which we had previously suffered.

Why, then, it will be asked, did Congress prohibit an arrangement which other countries had recognized as the only means of preventing the worst railroad abuses? It was because the prevention of such abuses was not the only aim, nor even the primary aim, of many who passed the laws.* A larger part of the legislators were influenced by hostility to corporate power as such. Anything which increased that power, even though it rendered it less liable to specific abuses, they disliked; anything which lessened that power they favored, even though it carried with it the certainty of irresponsible acts on the part of the agents of the company, in defiance alike of the law and of the stockholders' interests. In England or Germany, where the object was to prevent discrimination, the law encouraged pools, and made them a means to its ends; in America, no such result was possible, because the prevention of abuses was mostly a pretext, and the power itself, apart from its abuse, the real object of hostility. Something of this was seen in the events preceding the passage of the Interstate Commerce Act. The Senate, and especially its eastern members, strove to check abuses; the House, and especially its western members, strove to reduce rates and to take the power of self-defense out of railroad men's hands. The result was a compromise, which in its many inconsistencies bears traces of the conflicting elements in which it had its birth. In the legislation of many states, the extreme party had fuller sway, and railroad powers and profits have been sweepingly attacked.

The agitation against the railroads has many points in common with the land agitation in Ireland. Absentee ownership is at the bottom of the trouble in either case. Property is owned in one place and used in another: and the users, not satisfied with the conditions of use, insist on taking the business direction into their own hands. They claim the right to fix rates in Iowa, for the same general reason by which they claim the right to fix rents in Ireland.

Will they make their claim good, and, if so, how far? This is one of the most important questions of modern times. It strikes at the very roots of social order. If the investors are not to manage the business, the whole system of modern finance will be overthrown. It is one of the essential principles of our industrial life that the community is best served by having its industries managed, as business, on good business principles; and that any scheme which claims to do better than this is likely to do worse; in other words, that, within proper limits, a business man, in serving himself, serves the public also. This has not always been recognized. There was a time when the magistrates tried to fix rates for the ordinary articles of consumption, just as they now do in some states for railroads. But the effort to meet the difficulty in this way proved worse than useless. If prices were high, it meant that there was a scarcity of the goods or services in question. If you allowed business men to charge higher rates, it prevented that scarcity from continuing. If, on the other hand, you attempted to reduce rates by law, you took away all inducement to meet the demand, and made the scarcity continue indefinitely. You were trying to cure the disease by repressing the symptoms; and you only made matters worse by shutting off the natural means of relief.

Sometimes it will happen that the business men do not meet the legitimate demands of the community, in which case they expose themselves to special legislation which takes matters out of their hands. Ireland furnishes a good example. The system of absentee ownership and rack rent has prevented the investment of capital and the use of modern methods, which would have contributed to the support of the population. But the system of private railroad ownership, and of charging what the traffic will bear, has not prevented the investment of capital or the use of modern methods. It has given more railroad service, and cheaper railroad service, than that of any other country. In fact, it is just because so much capital has been invested that the railroads seem to be helpless against forced reductions of charge.

But they are not so helpless as they seem. The same causes which made it disastrous to fix the price of bread by statute operate in the case of railroad transportation; more slowly and obscurely, it is true, but none the less certainly. The community which tries to reduce rates by law will get less service than the one which leaves the roads free to charge what they can, within certain well-defined limits of public policy. This result was seen in Wisconsin fifteen years ago, where the very men who were most anxious to pass the "Potter Law," in 1874, were readiest to repeal it two years later. It is seen in Iowa to-day, where, as a result of radical legislation with regard to rates, railroad construction has almost entirely ceased, the average for the years 1888-1890 being less than fifty miles. It is seen to some extent in the Northwest, as a whole. At the close of the year 1887 the States included by Henry V. Poor in the Central, Northern and Northwestern groups had 25,040 miles of road, while those of the South Atlantic, Gulf and Mississippi Valley had but 24,567. To-day this relation is reversed, and the Northwest has but 27,294 miles, while the South has 30,696.

Nor has the mania for legislation reduced rates to the extent which might be supposed. It has reduced profits, which is quite a different thing. The average ton mile rate in the United States in 1882 was 1.23 cents; in 1886, 1.04; in 1890, 0.93. The fall under the action of competition was nearly twice as great as in the period of legislation following. What actually did happen is best illustrated by the experience of the Northwestern group.* The average receipts per ton mile, the natural unit of service rendered to the public, were in

1882	1.93 cents.
1886	1.42 "
1890	1.06 "

There was simply a continuance of the process reduction which had been previously going on. But the receipts per train-mile, the unit of work done by the railroad, actually rose in the first period, and fell tremendously in the second. The figures are as follows:

1882	$2.11
1886	2.20
1890	1.67

The lesson is obvious. The management of railroads as business concerns did not prevent reductions in rates, but it allowed such reductions to be combined with good railroad economy in such a way as not to check the development of the business. The effort to fix rates by the local authorities did not actually reduce charges any faster, and it cut into profits in such a way as to check railroad construction and development.

Where are we to find the limit to such unwise action? Mostly in the self interest of the parties immediately concerned. The United States Supreme Court can do something, and has shown a disposition to do something. In the Minnesota cases it repudiated the doctrine of uncontroled rights on the part of the legislatures to make rates as emphatically as it repudiated the doctrine of uncontroled rights on the part of agents of the corporation in the Granger cases twelve years before. But it takes a long time to get matters before the Supreme Court. The economic check can be made quicker than the legal one. If investors cease to use their money in developing those sections where they are subjected to adverse legislation and develop those which leave them free to act on business principles, the lesson in political economy will be soon learned and well learned.

It is here that the financiers in a body like yours have a duty to the public which has not always been fully understood. They are sometimes apt to let themselves be dealers in securities, rather than actual leaders of public affairs. A striking instance of this mistake was seen when the Interstate Commerce Railway Association was formed. The readiness to invest which had prevailed in 1886 and the first half of 1887 had been succeeded by general distrust. It was impossible to sell railroad securities to advantage. Under these circumstances, an association was formed with the intent to restore public confidence. Of permanently efficient means to deserve it, there was comparatively little thought; the one ruling idea was to support the market. Luckily the market refused to be supported. If capital had come in for investment, we should have lost the one check which we now have on the action of state legislatures.

It seems probable that we have gone far toward reaching the limit where such control will make itself felt. The amount of railroad legislation this year is noticeably less than last. There have been three years of slack railroad construction, while business has been expanding; and if business grows while mileage does not, the rate of profit is bound to increase, even in the face of adverse legislation. The valuation of railroad securities has fallen to the basis of accual railroad profits, so that ordinary bond issues, at their prices last August, brought over five per cent., and indications are not wanting that an advance has begun. It is in the power of the bankers and financiers of the country to make that advance more permanent and less spasmodic than has been generally the case in the past. But to do this they must regard themselves as holding a public trust. The abuses of railroad power in the past have made adverse legislation possible; the reckless duplication of roads has made it disastrous. They must prepare to control their roads so as to check the former danger, and refrain from encouraging investors to court the latter. It will require labor and self denial on their part for which there is no direct pecuniary return in sight. It is the price they must pay for maintaining the position of trust and honor which they now hold in the community. Though we may not like to face it, the demand for state socialism is ever present in the background. The financiers will be allowed to control the industries of the country only so far as they continue to prove their fitness to do so. If they, by implication, confess themselves incompetent for their position of leadership, or unable to hold to a far-sighted policy at some sacrifice of private gain, there will be an irresistible demand for state railroads and state industrial enterprises of every kind. The fact that state railroad management or state socialism in any form has failed to meet the standards of efficiency to which the American public is accustomed, would not prevent the experiment from being tried. Gentlemen of the Bankers' Association, we look to you to do what lies in your power to prevent this. You hold a public trust; do not treat it as anything less, or run the risk of forfeiting it by undervaluing its public character.

APPENDIX A.

Securities not affected by railroad legislation:

	Prices Apr. 4, 1887.	Prices Nov. 4, 1891.
Adams Express	144½	146
American Express	109¾	117
U. S. Express	63	54
Wells Fargo Express	128	139
Pullman Pal. Car Co.	152¾	190+
Western Union Tel.	77½	82½
Securities only partly affected by railroad legislation:		
Del. & Hudson C. Co.	162	128+
D., Lack. & W.	134	140
Central of N. J.	75	114
Phil. & Reading	40	39
Railroads affected by the pooling clause but not by the rate clauses.		
N. Y., C. & H. R.	113	112
N. Y., L. E. & W.	35	30
Do preferred	74	69¾
Pennsylvania	58½	54
L. S. & M. S.	96	123
Balt. & Ohio	167	103
Railroads affected by the rate clauses but not by the pooling clause.		
Rich. & W. Point	42	13¾
Do. preferred	76	58¼
E. T. V. & Ga	14	6
Do. 1st preferred	76	44
Do. 2d preferred	26	13½
Mobile & Ohio	18¾	41½
Louisville & Nashville	62	78¼
Railroads affected by both rate and pooling clauses.		
St. Paul, M. & M.	118	114
Northern Pacific	29	27½
" " Pref	60½	73
Union Pacific	61½	40
Central Pacific	40½	32
Atchison, Topeka & Santa Fé	106	43
Mo. Pacific	109	59½
Atlantic & Pacific	13	3¼
Texas Pacific	30	12
Contrast a foreign road with similar traffic.		
Canadian Pacific	62	89

APPENDIX B.

Average receipts per ton mile and per freight train mile in cents.

	1882.	1886.	1890.
U. S., ton-mile	1.23	1.01	0.93
" train mile	159	157	153
New England, ton mile	1.70	1.53	1.37
" train mile	159	170	165
Middle States, ton-mile	1.01	0.90	0.82
" train-mile	163	154	156
Central Northern, ton-mile	1.03	0.88	0.79
" train-mile	143	132	134
S. Atlantic, ton mile	1.71	1.22	1.03
" train-mile	142	143	148
Gulf and Miss. Val., ton-mile	2.06	1.31	1.04
" train-mile	102	170	154
Southwestern, ton-mile	1.94	1.56	1.35
" train-mile	194	191	180
Northwestern, ton mile	1.94	1.42	1.06
" train-mile	217	221	160
Pacific,* ton-mile	2.03	2.28	1.56
" train-mile	242	341	223

* Changes in methods of return make the Pacific figures unreliable.

The New 100-H. P. Thomson-Houston Freight Locomotive.*

In the matter of increased power required for electric motors for the transportation of freight, the Thomson-Houston company has taken a leading position. They have given this subject much attention, and recently built what may be said to represent the first large electric freight locomotive for use on a standard gauge railroad. This was built for the Whitinsville Machine Co., of Whitinsville, Mass., for carrying merchan-

* It should be said that part of the legislation against pools was due to the fact that such forms of combination had just begun to attract public attention, and that railroads felt the force of the legislation which was at least equally directed against manufacturing concerns. Laws against combinations, not specifically aimed at railroads, were passed in Kansas, Maine, Missouri, Nebraska, North Carolina, Tennessee, and Texas in 1889, in Iowa, Kentucky, Michigan, Mississippi, North Dakota, South Dakota, and Washington, in 1890; in Alabama, Illinois, Louisiana and New Mexico, in 1891, besides supplementary laws in Maine, Missouri and Tennessee.

* For details for other groups, see Appendix B.

* For the above description and cuts we are indebted to the *Electrical Engineer*.

dise between the railroad station and their works, a distance of 1½ miles.

The locomotive which is illustrated in fig. 1 is built with a platform for carrying loads, and pilot and drawbar at each end. The power is to be furnished by a large generator and conveyed over a trolley wire, from which it is taken by means of a universal trolley bar attached to the locomotive.

The construction of the truck is shown in fig. 2. The motor employed is one of the well-known "G" type of the Thomson-Houston Electric Co., and the power is communicated from the armature to the rear axle by means of double reduction gearing, and from the rear axle to the forward one by means of parallel rods. The motor consists of wrought iron field magnets, which are bolted to magnetic yokes of mitis iron. One of these yokes carries the bearings which support that end of the motor on the axle, while the other yoke is spring supported from the other axle. This keeps the gears always in line and meshing correctly with each other, and at the same time provides considerable spring support for the motor.

The gearing consists of aluminum bronze pinions and mitis iron gear wheels. The gearing runs in boxes, in which a plentiful supply of grease is placed, thus decreasing the noise, friction and wear, and increasing the life of the gears very materially. On the intermediate shaft is heavily keyed a mitis iron brake drum, covered with wood lagging. It is embraced by two half bands of steel, tightened upon it by means of the brake drum lever, situated in the operating stand.

The wheels are 42 in. in diameter and are heavily steel tired, and the frame consists of two heavy side plates, in which are located the main axle bearings. Two heavy cast iron end plates, in which are fixed the pilots, are bolted to the side plates by means of heavy through bolts, which are a driving fit in reamed holes. These end plates carry the draw-bars and bumpers.

The operating platform is at one end of the main platform and is incased in a railing and covered with a protecting roof. On this platform are the levers for operating the controlling mechanism, the brake and the double acting sand boxes. The universal trolley bar also extends upward from the locomotive at this point, as shown in fig. 1.

The controlling mechanism consists of two large rheostats of the well known Thomson-Houston railroad type. These are so arranged with their contact shoes that no reversing switch is needed. The operator stands so that he always faces in the direction in which the locomotive is to go, and pushes the rheostat lever from him to make the locomotive go forward, and pulls it toward him to make it go backward. A positive centre lock is provided, so that in turning the current off there is no danger of passing the neutral point on the rheostat, and so reversing the locomotive with the current on.

The following data give the details of construction of the new locomotive, the construction of which has been under the direct supervision of Mr. J. P. B. Fiske, who is in charge of all the motor work of the company, except that relating to street railraods and long-distance transmission:

Wheel base	6 ft. 4 in.
Diameter of wheels	42 in.
Speed reduction between armature and axle	1 to 25
Gauge	4 ft. 8½ in. standard
Wheel base	6 ft. 4 in.
Measured height above rail platform	4 ft. 4 in.
Greatest length of loco. (at cowcatcher)	15 ft. 9½ in.
Greatest length of platform	12 ft. 7¼ in.
Greatest width of platform	7 ft. 1¼ in.
Weight of complete locomotive, less trolley poles	42,525 lbs.
Approximate meight of motor	5,400 lbs.

A combined main switch, lightning arrester and fuse box is placed within easy reach of the motorman, so that he can instantly shut the current off from the locomotive by a slight movement of the hand.

The construction of the motor is of the most rigid and waterproof character, the field spools having their wire enclosed and entirely sewed up in canvas bags, which are covered with a heavy coating of waterproof paint.

The locomotive is designed to operate at 500 volts, and to develop 100 H. P. at the draw bar. This will enable it to pull a train of four to six heavily loaded cars, or an aggregate load of 200 to 300 tons, at a speed of five miles an hour on a level.

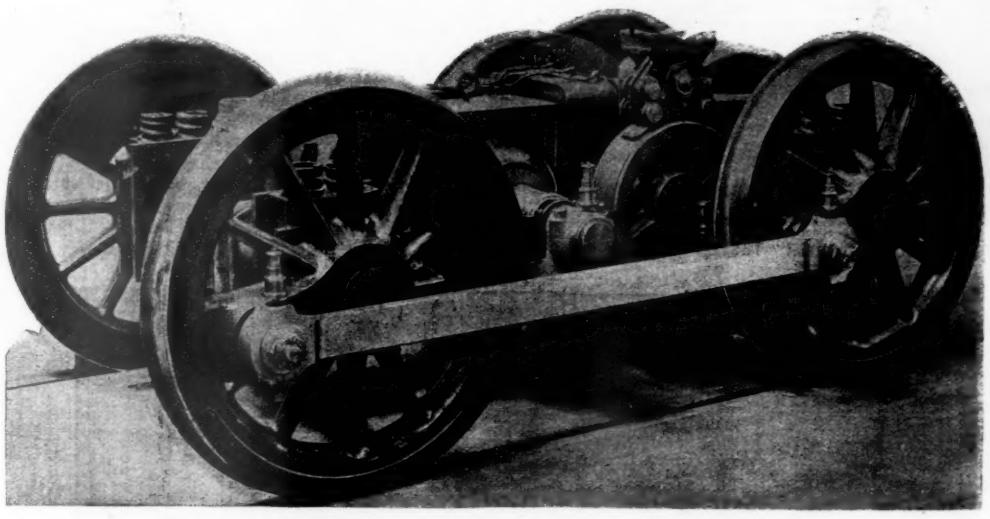


Fig. 2—Truck of 100 H. P. Thomson-Houston Freight Locomotive.

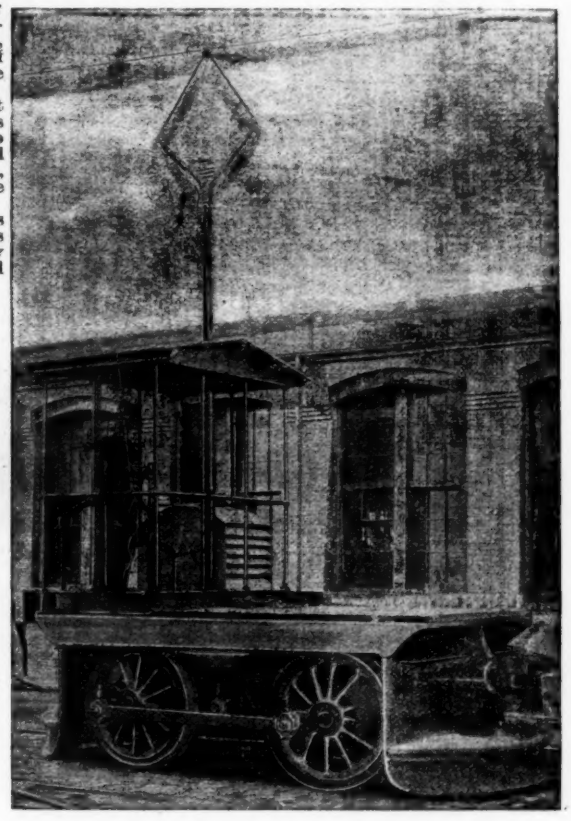


Fig. 1—100 H. P. Thomson-Houston Freight Locomotive.

Master Car Builders' Standards and Defect Cards.

At the November meeting of the Western Railway Club Mr. P. H. Peck presented a short paper on the above subjects. The first portion of it we have condensed considerably. The second portion appears in full.

The chief fault I find with the Master Car Builders' standards is that there are not enough of them. The greater number of valuable standards we have, the less expense and delay we will have in the interchange of cars, and the repairs per car mile will also be cheapened thereby. I believe that the whole car should be standard, and every piece of it should be like that of other cars of the same capacity—cars should be ordered as we now order axles—M. C. B. standard. As it is now, to replace a corner post we have to remove the old one, and make one just like the one removed. The same is true of other parts of the car; very few of them are of tho same dimensions. To day we could have in stock 500 such pieces, and they would not suit more than one out of 500 cars; if the standards I am here advocating were adopted, one piece in stock would suit any car of the 500.

Take the air-brake, for instance: if its parts were not uniform for all cars I am certain there would not be as many in use as there are now. They would be of no value off of the road that equipped them, as hose and couplings would have to be changed in order to use them, and repairs would be costly and even impossible in some cases.

Our company has recently been equipping one of its passenger depots with steam pipes to heat coaches standing in the shed. In order to do this satisfactorily the piping to each track that required steam heat had to be fitted with five different kinds of steam hose couplings, as there are five roads entering the depot, each equipped with steam, and each road having a coupling different from the others.

The Association has a standard drawbar, but about all that is standard is the contour. Some of these couplers are bad; none of the knuckles will interchange and the uncoupling devices are in the same condition; some are on the right, some on the left; some raise to disengage the lock; some push down; some push in and others pull out. I want to call attention to one fact which goes to show that there is no occasion for such a diversity of couplers and unlocking gears. Of 19 different kinds of M. C. B. drawbar, 14 of them can be uncoupled with a proper design of shaft placed across the end of the car and above the coupler. What we want is a standard type of coupler, a standard uncoupling device, a standard knuckle, and I may also add, finally, a standard car.

DEFECT CARDS.

The use of M. C. B. cards is to facilitate business and to place the cost of car repairs on the road that damaged the car, but the way some cards are made out has caused much annoyance and numerous delays at heavy interchange points. As an instance in which improper wording of defect cards caused trouble, I may state that many inspectors make out cards (or have records where cars are interchanged by this system) reading "mixed drawbars." I think this term should never be used, for this reason: If road A should card a car to road B for mixed draw-bars (original standard for car being a Potter drawbar); this car at the time has a Potter bar at one end and common single link bar at the other end. This road breaks the Potter bar, puts in some type of a cast bar that differs from the one already in the car, and delivers it to road C. This road takes car carded by road A for "mixed draw-bars," and later on attempts to deliver to the owners, who refuse it because it has two wrong drawbars. Letters pass through my office almost daily for this cause alone, some of our connections hunting back to try and get card for a wrong draw-bar. I have instructed our inspectors not to use "mixed draw-bars," but to make out the card for either one or two wrong bars.

A card came to me on its way back South a month or so ago. The card was put on by a joint inspector at Chattanooga, Tenn., and read, "Will be received with one odd draw-bar," and had passed from Chattanooga to Chicago. I returned the card to owners of car, and told them I would bill for it, as I considered it good for one wrong draw-bar.

Another cause of annoyance and delay is that many inspectors have no authority to card cars without getting permission from their foreman. I have known cars to be refused and held several days on a side track, afterward to be carded back by the road that delivered the car, whose foreman, after seeing the car, would give permission to card it. In such cases as these the road would have to pay for hauling the car and also for the repairs.

Another evil is the great variation in the amounts of the bills for the same kind of work done on the authority furnished by cards. Last month I returned a bill of $9.15, the card for which read, "One truss rod broken"; another bill of $22 for one sill in flat car, and one bill of 50 hours' time and one-half gallon of paint, the card for which read, "One damaged dead-block." The bill was cut down 25 hours. Most all the roads, however, are very fair and honest in their repairs. The above are only a few cases to illustrate how some parties will take the advantage where there is no limit of labor on the work done. Last year Mr. Lewis, of the C. B. & N. Railroad, offered a resolution in this club establishing the hours of labor to be charged on various classes of repairs. The President of the Southern and Southwestern Club, at the meeting in Louisville, May 21, offered a similar resolution, which was adopted. I think this a good idea, and is worthy to be taken up again before the next M. C. B. convention. Prices of labor can be established on all work done in cars with the same fairness that is done in removing wheels, and I think it would give just as good satisfaction.

The Scientific Study of American Timber.

BY PROF. J. B. JOHNSON.

The physical properties of timber are so various and changeable that no adequate attempt has been made hitherto to discover the laws of the causes of these varying results. The chief of the Forestry Division of the Agricultural Department, at Washington, Dr. B. E. Fernow, has now formulated a scheme of experimental researches in this field, which far exceeds, in its scope and in the magnitude of the work, any similar investigation ever undertaken in this or any other country. It is nothing less than a complete study of all the significant physical properties of all the commercially valuable timbers of the United States. This is to be done by selecting five trees of each species, from four or more different sites, thus making twenty or more trees of each species, and making complete experimental studies of the timber in all these trees.

The trees are selected, felled, sawed into logs and disks, and shipped by an experienced forester and botanist, who makes a record of all the significant conditions of growth, such as soil, surroundings, age, height, diameter, height to first limb, etc., etc. The numerous disks are sent to Professor Roth at Ann Arbor, Mich., and the logs are shipped in car-load lots to the writer at St. Louis. Here they are sawed to appropriate sizes, at least three small sticks and one large one being cut from each log. The smallest size is 4 × 4 in., and the largest 8 × 16 in. in cross-section. By comparing beam tests in different sizes of beams from the same log it is expected to show whether or not it is safe to reason from tests on small specimens to the strength of large beams. Tests are made in cross-breaking, shearing, tension, and in compression along and

across the grain. All these are made at the Washington University Testing Laboratory, on machines having a capacity of 100,000 lbs., except the 4-in. square beams, which are broken on a smaller beam-machine, having a capacity of 6,000 lbs. The details of all the methods, results, and appliances used will be given at intervals in special bulletins from the Forestry Department, which bulletins can be procured on application to Dr. Fernow as above.

Seven car-loads of logs have now been tested, mostly white and yellow pine, and white oak. An investigation is about to begin upon southern pitch pine to discover whether or not any injurious effects result from the practice of "boxing" to obtain the turpentine. It is expected that these tests will exhaust the small appropriation made last year for this work, and that the work will then be stopped to await further appropriations.

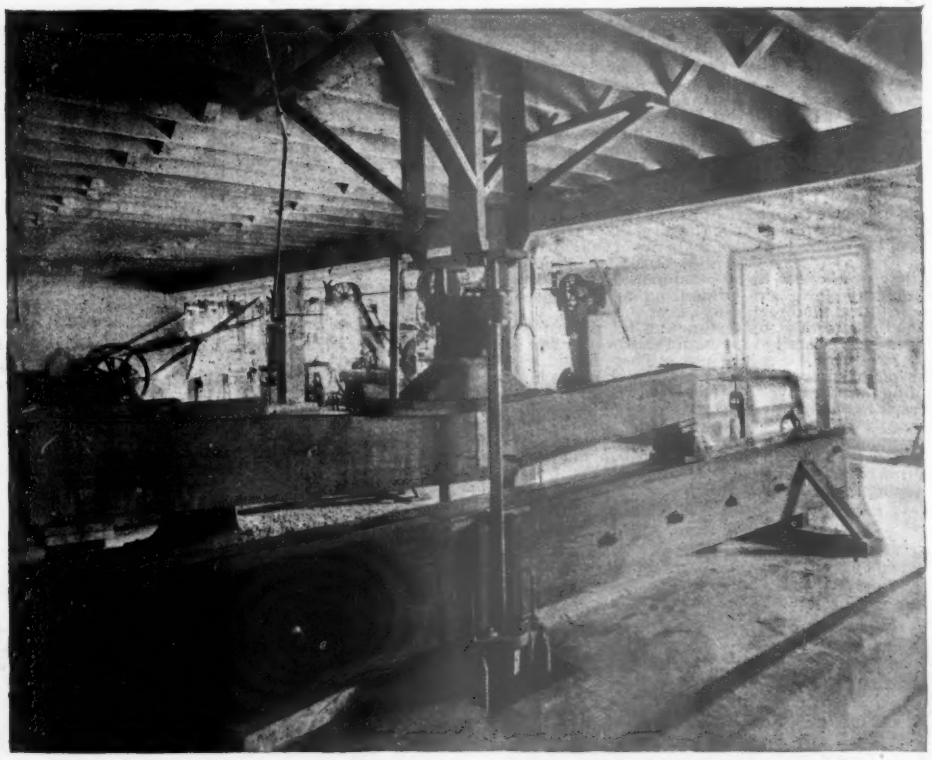


FIG. 1—LARGE BEAM TESTING—UNITED STATES TIMBER TESTS.

THE BEAM TESTS.

A special machine, shown in fig. 1, has been built for testing the large beams. Its base consists of two long-leaf yellow pine sticks 6 in. × 18 in. × 24 ft. long, and a steel plate ¾ in. × 18 in. × 20 ft. long, all bolted up into one flitched beam. The load is applied at the centre by means of a hydrostatic pressure cylinder placed below the beam. This is connected to the same pump which operates another 100,000-lb. testing machine of the Riehlé pattern in another part of the room. When this latter is blocked, and the liquid is pumped into both machines, the load on the beam machine can be weighed on the Riehlé machine. By means of a nest of calibrating springs, having a capacity of 50,000 lbs. with a deflection of about 2 in., which has already been tested on the Watertown arsenal machine, the accuracy of this arrangement can at any time be tested. The deflections are read upon a paper scale tacked to one side of the beam at its centre, backed by a mirror, across both of which a fine thread is stretched over nails at the ends and held taut by a rubber band. By bringing the thread and its image into coincidence all parallax is avoided, and the string may be placed so far from the stick as to be certainly free. This machine will test the largest beams ever used.

The small beams are tested in the machine shown in fig. 2, which the writer devised several years ago especially for breaking cast iron beams in test specimens, and measuring their deflection to the nearest 0.001 of an inch by means of a micrometer screw. In all beam tests the loads are put on at a uniform rate, and the deflections and corresponding loads frequently read off as the test proceeds. These results are then plotted with a strain diagram, as shown in fig. 3, which is the test of a beam of loblolly yellow pine 8 in. × 16 in. in cross-section and 12 ft. long. The diagram is drawn directly on the sheet containing the original record, the following being a photo-engraving of one of these record sheets.

The curve *O D C* is the complete diagram, the vertical distance from the base line representing load, and the horizontal distance from the vertical axis *O Y* representing deflection. The area of this curve, *O D C*, properly evaluated by the scales of load and deflection represents the total number of inch-pounds of work required to break it, and hence the energy absorbed by the beam before rupture. This is the "Total Resilience" given with other results at top of page. If this be divided by the number of cubic inches in the stick, we obtain the number of inch-pounds of energy per cubic inch of timber, taken up by the stick before rupture occured. This is not a very satisfactory result as a basis of comparing the toughness of different sticks, and is therefore not used for such comparisons. A better basis is to take some definable point in the curve, as the point *P*, and compare the areas of the curve up to this point, for the different tests. These results, when reduced to the basis of inch-pounds per cubic inch of timber, show the true relative, working resistance to shock, or the toughness of different species. The writer calls this result the "relative elastic resistance" in cross-breaking, and it is found to be a most excellent criterion of what is commonly termed the toughness of the timber. The point *P* is that point on the diagram where the modulus of elasticity is two-thirds of what it is at the start or where the ratio of a given deflective increment, to the corresponding load increment, is 50 per cent. more than at first In other words, if *E O* is tangent to the curve at *O*, and *E F* = ⅔ *y e*, and *o f* is parallel to *O F* and tangent to the curve, this point of tangency is the point chosen. A point found in this way nearly always falls on the part of the curve where it begins to curve off rapidly and though arbitrarily chosen is analogous to the elastic limit point in the strain diagrams of metals. We cannot speak of the elastic limit of timber, because any load, left on a sufficient time, will result in a permanent set. The modulus of elasticity is found from the tangent at the origin by the ordinary formula for the deflection of a solid rectangular beam loaded at the centre. All the beam tests, both large and small, are recorded and worked up in this manner.

Without going into the details of the tests for moisture, specific gravity, tension, shearing, and compression, all of which will be explained in the forthcoming bulletins, it may be said that every precaution is taken to obtain all the pertinent facts in the hope that in the end when these facts come to be studied and discussed, some fixed laws and principles will be established which can then be applied for all time. Fig. 4 shows some of the broken specimens in tension The tension tests are made on sticks 2½ in. by 1½ in. by 14 in. long, which are reduced at the centre to a thickness of ⅝ in. by cutting circular segments from each side. These are then pulled in the plain wedge-shaped grips used for breaking iron nd steel specimens.

The shearing tests shown in fig. 5 are made on specimens 2½ in. by 2½ in. by 8in. long. They are slotted at both ends, in planes at right angles to each other, and both ends pulled out by means of rectangular pins and suitable stirrups. The figures at bottom are the strengths in lbs. per sq. in. in each case.

It has been found that the strength of woody fibre, in all ways, varies considerably across the section of the log. The strongest wood is about one-third the distance out from the heart. If the strength be indicated by ordinates from the base line *A B*, fig. 6, and the point *C* epresents the heart of the tree and *A* and *B* the outer layers, then the strength of the several rings will vary somewhat as the lengths of the vertical lines here shown.

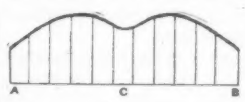


Fig. 6.

It has also been shown that knots are a source of weakness, even in compression. Season checks, cracks, and wind shakes, if continuous and found near the central axis of a beam, are also a great source of weakness, the extreme case being when the beam has practically become two beams, one superposed upon the other, when the strength is reduced one-half.

TESTS OF OLD STRINGERS.

It is safe to say that no one is now able to judge of the strength of a stringer or floor beam which has been in service seven or eight years. It is then checked and cracked more or less along its centre line from seasoning; there are certain knots on top or bottom, or both; some indication of decay has developed; borings show an apparent brittleness of the interior cellular tissue, and it is an unanswerable question whether or not it should come out and be replaced by a new one. The bridge inspector or superintendent decides the question one way or the other, without really knowing anything about the degree of depreciation it has suffered, or whether or not it is any weaker than when first put in. It is certainly much stronger after seasoning than when green, and may be stronger yet. It is removed or allowed to remain more as a result of a feeling the inspector may have in the matter than from any knowledge he can possess. Dr. Fernow will undertake to make tests of such timbers free of charge, and report upon the same, if delivered at the Washington University Testing Laboratory, St. Louis, such tests then becoming a part of

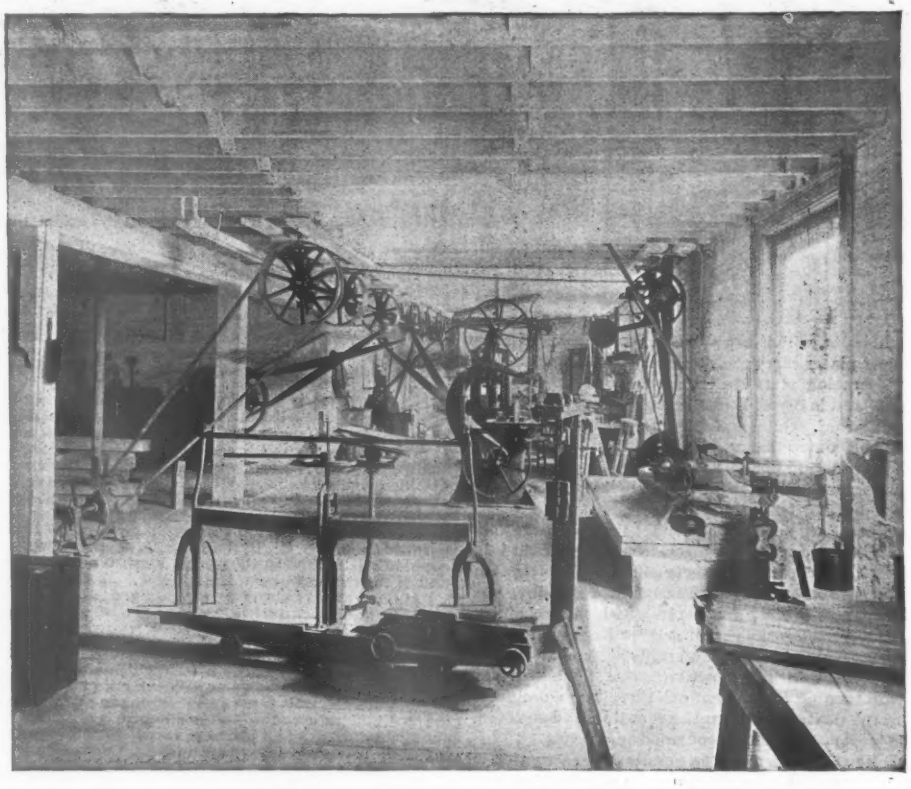


FIG. 2—VIEW OF TESTING LABORATORY.

the general study of timber; that is, provided satisfactory information can be furnished as to the species of timber, age, origin, length of service, etc.

If the men who are charged with the duty of renewing old timbers could witness these tests, and a whole carload could be selected for testing at one time, such employés would have their judgments so educated as to

CROSS BREAKING TEST.

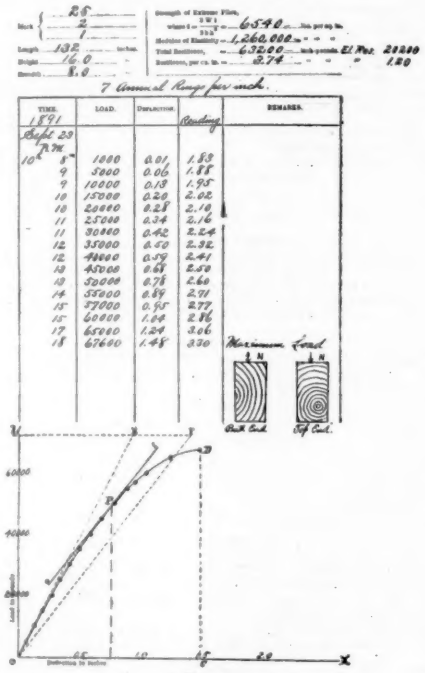


Fig. 3.

be able to decide with some assurance on the strength of old timbers in future. Some railway officials have already agreed to send in such rejected timbers, and until a sufficient number have been tested, of all the ordinary species used for such purposes, this offer stands open. The timbers may be of any size or length, and should be taken just as they were used in the structure. It would seem that our more important railway companies should avail themselves of this opportunity.

Treatment of Locomotive Boiler Water.

At the October meeting of the Western Railway Club Mr. J. N. Barr presented a paper on the above subject, which was published at considerable length in a recent issue of the *Railroad Gazette*. An abstract of the discussion on this paper, which was held at the November meeting of the club, follows:

Mr. FORSYTHE: While I have been on our road we have not made any experiments in this direction. The paper shows the success which has attended the use of this compound on the Chicago, Milwaukee & St. Paul road as indicated by the manner in which it kept the firebox and flues clean, but there is nothing said about the economy of the use of it. Before going into such a practice extensively, I should want to know what it costs, and whether it is the proper or best method. In calculating on the cost, there is the value of the chemicals employed to be considered, also the value of the fuel which must be expended in heating that water which is blown off and that which escapes through the cylinders by reason of the foaming in the boiler. It would have been interesting if Mr. Barr had run two engines, one with and the other without this boiler purge, for a sufficient time to get a valuable account of the cost of boiler repairs, fuel and chemicals in the case where the compound was used, and the cost of boiler repairs and fuel in the other. Where an engine is blown off frequently, there must be a waste of that heat which is carried off in the water; on the other hand, there is the economy due to a better evaporation where heating surfaces are kept clean.

Is the "direct method" the best one? The ideal arrangement would be to purify the water in the station ary water tanks, instead of in the tanks of the locomotives. In doing this some of the objections to the locomotive plan would be overcome. There would be no scales on the injectors and in the checks, and it would do away with the foaming. The locomotive is not the proper place in which to establish a chemical laboratory. It should be supplied with fuel as concentrated as possible—that is, coal having as great an amount of carbon or hydrocarbon as you possibly can get—and with water just as pure as can be obtained. There is enough to do on a locomotive after you get those without trying to carry on any other processes.

Mr. GIBBS: The compound costs, barreled at the roundhouse, four cents per gallon, varying a fraction of a cent with the varying price of chemicals. You can very easily calculate the cost for a trip, or per train mile run. For instance, on the Chicago division I think the quantity of compound we are now using is about seven quarts for the run of 85 miles; that would make a cost of between seven and eight cents to purify the water for that trip.

As to the purification of water in some other place than in the locomotive boiler, I think all will agree that Mr. Forsythe's view is the correct one, provided we can carry it out. I have made personally a great many experiments in purifying water, beginning with the well known Clark process, which is merely precipitating the lime salts with milk lime. The chemistry is simple. It leaves nothing behind, and theoretically it is the best we can do, but practically it is too difficult. If you add too much lime you intensify the trouble; the lime goes into the solution, and you get harder water than you started with. To do it properly requires an elaborate plant and a very careful man, and after treatment the water should really be roughly analyzed to tell whether enough lime has been added. After working a considerable length of time on this process we were forced to give it up as impracticable, even in the laboratory.

The so called "mechanical" processes—various forms of apparatus in the boiler—have been proposed and tried for locomotives. On stationary boilers, where the evaporation is low and the circulation of the water slow, I think they will meet with considerable success. For locomotives I have never seen any advantage in them. The amount of water evaporated from a locomotive boiler is extraordinary and the rapidity of the feed is so great that in going through these purifiers it is liable to carry the sediment into the boiler. Beyond the fact of having this mud sediment in the boiler blown out periodically, I see very little objection to our present method of using the compound. It is probable that this mud causes foaming itself, but the alkali has probably more to do with it than the mud, so that getting rid of the mud in outside tanks would not altogether prevent the difficulty in foaming.

Mr. MCNAUGHTON: I have three mechanical purifiers, two Field and one Barnes. For the past nine months I had one of each running in water similar to that used by the Milwaukee road, and as yet they show no scale formation whatever. We run the engines about 5,000 miles without washing out, and boilers without the purifiers average about 1,500 miles between washings.

Mr. HERR: As to the economy in the use of this purge, the water by this chemical and then attempting to wash it out. In marine engine practice the proper use of the blowoff cock is important. When an engineer comes on watch his first duty is to test the density of the boiler water. If, by the use of the hydrometer, he find that the water contains more impurity than is allowable, he immediately opens his blowoff cock and reduces the density of the water in that way. If more care was employed in using the blow-off cock and relieving the boiler of these impurities before they have a chance to deposit themselves, we could get much better service out of our boilers. The old practice of blowing off the boiler while it is hot before washing it out is most injurious, from the fact that whatever sediment and incrusted matter remained on the iron was burned on the iron and fixed there.

For the last year or more I have made a practice of using coal oil. When a boiler is washed out, and before it is filled with water, I have a gallon of coal oil poured into it, and as the water rises in the boiler the coal oil floating on the surface deposits itself on the surface of the iron. There is no chemical action; we know that coal oil is very penetrating; that you can take a block of cast iron of reasonable size and pour a little coal oil on it and it will permeate through that block. My idea about the coal oil is that it will permeate the scale, or go between the scale and the iron, lifting it from the iron, and then the expansion of the boiler, due to heat, will crack off the scale, and it can be removed when the boiler is washed.

Mr. HERR: On the Madison run the four quarts takes care of the incrusting matter. On the run to Milwaukee the amount theoretically is fifteen quarts, and we use nine. I shall increase it to ten, and after a while make it even more. The engines are not entirely clean, but they are very much better than they were. In order to try the effect of the purge itself, as distinct from the blowing-off feature, I would say that, without making any change in the way the water was blown out of the boiler in engine No. 335, I reduced the quantity of purge supplied from four quarts to three quarts. Before this we used five quarts; the engine was clean. We reduced it to four quarts; the engine remained clean. We then reduced it to three quarts, and after three or four weeks I noticed a distinct formation of scale on the sheets of the boiler. I then increased the amount of purge to four quarts again, and the scale disappeared. It does seem strange that so small an amount of purge will take care of such a large amount of incrusting matter in the boiler, but the fact, nevertheless, remains that it does so.

The question as to whether this compound caused foaming was quite a serious one with us at first. The engineers claimed it did. On a run where we used regularly seven quarts of purge the engineers claimed trouble from foaming, especially when they had to work their engines hard. In order to test the matter, I put into the engine 17 quarts of purge and rode on it, with a full train up a 25-ft. grade, and the engine did not even raise the water; but with the same character of water and not as much purge I have seen considerable foaming produced, due, in my opinion, to the precipitated solids in the water. But as to the amount of this compound that can be put into a boiler I can only refer to some of the statements of the engineers on the Mineral Point run, where one man states he has put in as much as 50 quarts.

Mr. GIBBS: I want to say a word more about this compound, the practical workings of which are described in Mr. Barr's paper. Six years ago, when this was first brought to my attention, the compound was made in West Milwaukee, in a building where it was kept under lock and key. It had been bought from an old soldier whose name was Graves. One of the conditions of the sale was, that no one should know what was in it. When I took charge of the chemical laboratory I asked to be allowed to examine the compound. The Master Mechanic refused to allow me to touch it. I obtained some and analyzed it, and after doing so went to him and told him I had the analysis. The secret part of the composition consisted in the useless parts of it. Mr. Graves had used the very well known ingredients of caustic soda and soda ash, which any chemist knows will precipitate lime salts in water, and he added certain secret ingredients. Those ingredients consisted of sorghum molasses and lampblack. He added about a quart of molasses to a barrel of the compound, which gave it a very nice straw color, and added about a pound of lampblack. The lampblack was confessedly for plugging cracks. I then began to investigate the way it was used. It was used under the direction of Mr. Graves. He had experimented by hit and miss until he found the right quantity. Fortunately, the compound was an exceptionally good one, leaving out the sorghum molasses and lampblack. The chemistry of the process can be entered into, and proved to any one's satisfaction that it is a perfectly rational process and not a chemical absurdity. Nearly every master mechanic will say, "Yes; I have experimented with this, that or the other compound, and have never had any beneficial results." That was because it was not used intelligently. He did not know what it was, and the man who gave it to him knew nothing about the character of the waters to be purified. Is that a fair way to try any device—mechanical, chemical or otherwise? We know this compound will do certain things. It is not a matter of guess work, not a matter of speculation—it is a matter of experience. I do it will largely decrease the boiler work necessary in cleaning flues. Last year at this time our boiler work in the Milwaukee roundhouse was very much greater than it is at present; in fact, it is an exceptional thing now to call a boiler maker in to calk flues, whereas a year ago we would have two or three in the roundhouse nearly all the time. We handle about 120 engines at that point. Although a certain amount of heat is wasted in blowing out, necessary to rid the boiler of the sediment that is thrown down by the purge, this is partly offset by the increase of evaporating power, due to the clean sheets and flues.

There is no doubt but that this purge will clean a dirty boiler. I find boilers that were quite heavily scaled (as much as one-eighth of an inch on the firebox sheets) are now entirely clean, as a result of using the purge. One peculiarity about the compound is that it seems to attack the scale on the hottest sheets first. The sheets of the firebox will be the first ones to become clean, next the flues, then the shells, and lastly the bolts and braces.

My experience leads me to think that the foam is due principally to the sediment that is thrown down, and not the compound that has been introduced. To demonstrate the correctness of this idea, I had an extra large amount of the compound introduced in some of the engines, and watched their performance carefully. As long as the engine was clean—that is, after a boiler washing—no foam was caused, but often before the round trip was completed the boiler gave some trouble from foaming, due, I think, to the precipitation of the very fine sediment thrown down by the purge.

Mr. LEWIS: I have watched with a great deal of interest the experiments in the matter of chemical purification of water for the past twenty years, have tried a great many compounds—the Lighthall, Richmond and a number of others—and am convinced that it is a hopeless task to expect so gain any material benefits from the chemical purification of water in a locomotive boiler. The precipitation, not only of the incrustating substances in the water, but also of the substances that are in suspension in the water, is about as injurious as the regular deposit of incrustating matter in the water.

While free to admit that the showing Mr. Barr makes of the engine between Chicago and Madison is a remarkable one, I should not think it due entirely to the chemicals used. I believe there is more benefit derived from blowing out the boilers than there is by purifying

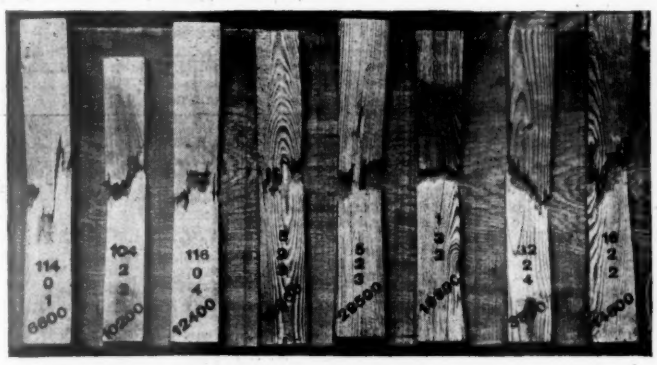


Fig. 4—Tension Tests.

Broken section 2½ in. × ⅜ in. White and yellow pine. Bottom figures show strength per square inch.

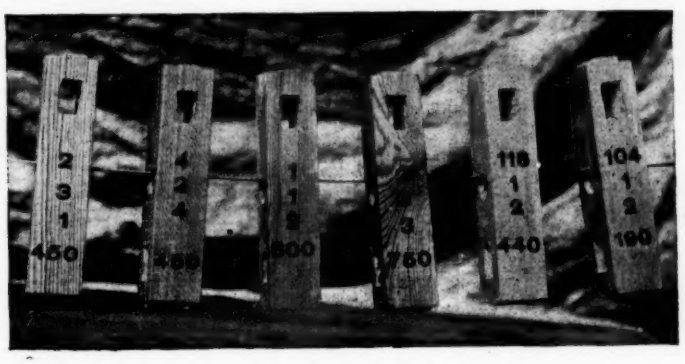


Fig. 5—Shearing Tests.

Sheared areas 2½ in. × 1 in. White and yellow pine. Bottom figures show strength per square inch.

not believe any master mechanic can afford to overlook our results. If you ask us whether we can purify the worst waters in the country, I will say, we may not be able to do so, but most roads have not those waters. The master mechanic will talk about the evils resulting from scale in the boiler. Every one can see that if this is an evil it can be easily obviated by the intelligent use of this compound. Oils have been advocated in a great many places for preventing scale in boilers. Their action, as Mr. Lewis states, is to break up the scale that is there and prevent scale afterwards. I believe this practice is very questionable, for experiments show that any film of oil on a plate is liable to permit of serious overheating of that plate.

Mr. QUAYLE: I have not had any experience with boiler compounds, but have recently used potatoes in a boiler. We could not keep the flues tight and we are unaccustomed to that trouble as we have on part of our road the best water in the country; in fact, we can run an engine four years without taking out the flues. We are using one peck of potatoes and we find that the impurities of the water seem to come out every time the boiler is washed, in the form of a mushy substance, about the consistency of cream and about that color, only a little dirtier. I have learned from a gentleman in Milwaukee, who is said to have had a long experience in this line, that he is using sorghum very successfully in stationary boilers as a water purifier.

Mr. GIBBS: About the potatoes and sorghum. Any vegetable substances can be used in a boiler and it will break up the scale, owing to the decomposition of the vegetable matter. The action of every vegetable substance is the same.

Comparative Tests of Compound and Simple Locomotives.

The following material concerning the performance of a Baldwin compound and two simple engines on the Mexican National, has been handed to us for publication, and we give it in full, omitting only the indicator cards and profile:

SAN LUIS POTOSI, Mex., Aug. 12, 1891.

Mr. Theo. D. Kline, General Manager:

I beg to hand you herewith report of test of compound engine No. 147, built for this company by the Baldwin Locomotive Co. October, 1890; also tests of our simple ten-wheel engines Nos. 145 and 133. Engine No. 145 is similar in every respect to engine No. 147 (except not compounded), and different from engine No. 133 only in

DIMENSIONS OF LOCOMOTIVES.

Locomotives.	No. 147 Compound.	No. 145 Ten-wheel.	No. 133 Ten-wheel.
Cylinders, size	10 in. × 20 in. / 17 in. × 20 in.	16 in. × 20 in.	16 in. × 20 in.
Driving wheel diam	46 in.	46 in.	46 in.
No. of drivers	6	6	6
Weight on drivers	52,000 lbs.	52,000 lbs.	48,000 lbs.
" " trucks	18,000 "	18,000 "	18,000 "
Weight of engine and tender full of water	130,000 "	130,000 "	120,000 "
Diameter of boiler shell	48 in.	48 in.	48 in.
Number of tubes	132	132	132
Size and length of tubes	2 in. × 11 ft. 9⅛ in.	2 in. × 11 ft. 9⅛ in.	2 in. × 11 ft. 9⅛ in.
Grate area in square feet	14	14	14
Diameter of exhaust nozzles	4 in.	3¾ in.	3¾ in.

TABLE NO. 1.

Performance of Engines Nos. 147 and 133. Passenger Service Between San Luis Potosi and Saltillo. Distance of 242.1 Miles. Up and Down Grade.

INDIAN TERRITORY COAL.

Number of trip	1	1	2	2
Number of engine	147	133	147	133
Hours on trip	10:25	10:25	10:35	10:35
No. of cars in train	4	4	4	4
Total weight of train, including engine and tender, in tons of 2,000 lbs.	135	130	135	130
Pounds coal consumed	7,284	5,184	6,067	5,409
Pounds water used	48,855	40,142	43,395	40,904
Pounds coal to one ton of load	53	39	44	41
Pounds water evaporated to one pound coal	6.77	7.74	7.15	7.56
State of weather	Heavy wind.	Clear.	Heavy wind.	Clear.
Cause of delay	None.	None.	None.	None.

Results.—Trip No. 1 shows compound engine consumed 36 per cent. more coal to one ton of load and evaporated 14 per cent. less water to one pound of coal than engine 133. Trip No. 2 shows compound engine consumed 7 per cent. more coal to one ton of load and evaporated 5.7 per cent. less water to one pound of coal than engine 133.

Note.—There was a new engineman on first trip who did not handle engine well.

TABLE NO. 2.

Performance of Engines Nos. 147 and 133. Passenger Service Between San Luis Potosi and Saltillo. Distance of 242.1 Miles. Up and Down Grade.

INDIAN TERRITORY COAL.

Number of trip	3	3	4	4
Number of engine	147	133	147	133
Hours on trip	10:25	10:25	10:35	10:35
No. of cars in train	6	4	5	4
Total weight of train, including engine and tender, in tons of 2,000 lbs.	165	130	153	130
Pounds coal consumed	7,670	5 390	7,568	5,619
Pounds water used	54,028	39,126	53,354	40,737
Pounds coal to one ton of load	46	41	49	43
Pounds water evaporated to one pound coal	7.04	7.25	7.05	7.25
State of weather	Windy.	Clear.	Clear.	Clear.
Cause of delay	None.	None.	None.	None.

Results.—Trip No. 3 shows compound engine consumed 12 per cent. more coal to one ton of load and evaporated 2.9 per cent. less water to one pound of coal than engine No. 133. Trip No. 4 shows compound engine consumed 14 per cent. more coal to one ton of load and evaporated 2.8 per cent. less water to one pound of coal than engine No. 133.

TABLE NO. 3.

Performance of Engines Nos. 147 and 133. Passenger Service Between San Luis Potosi and Saltillo. Distance of 242.1 Miles. Up and Down Grade.

INDIAN TERRITORY COAL.

Number of trip	5	5	6	6
Number of engine	147	133	147	133
Hours on trip	10:25	10:25	10:35	10:35
No. of cars in train	4	4	4	4
Total weight of train, including engine and tender, in tons of 2,000 lbs.	135	130	135	130
Pounds coal consumed	6,907	5,183	6,827	6,218
Pounds water used	49,717	37,347	47.705	41,566
Pounds coal to one ton of load	51	39	50	48
Pounds water evaporated to one pound coal	7.19	7.20	6.98	6.66
State of weather	Very windy.	Clear.	Very windy.	Clear.
Cause of delay	None.	None.	None.	None.

Results.—Trip No. 5 shows compound engine consumed 30 per cent. more coal to one ton of load and evaporated .1 per cent. less water to one pound of coal than engine No. 133. Trip No. 6 shows compound engine consumed 4 1 per cent. more coal to one ton of load and evaporated 4.8 per cent. more water to one pound of coal than engine No. 133.

TABLE NO. 1.

Performance of Engines Nos. 147 and 145. Freight Service Between Monterey and Saltillo. Distance of 67.8 Miles. Average Grade, 1.75 per cent.

INDIAN TERRITORY COAL.

Number of trip	1	1	2	2
Number of engine	147	145	147	145
Hours on trip	6:10	6:10	6:40	6:10
No. of cars in train	11	9	10	11
Total weight of train, including engine and tender, in tons of 2,000 lbs.	245.13	243.54	265.02	229.66
Pounds coal consumed	5,544	6,610	6,086	6,000
Pounds water used	35,923	45,060	43,395	37,934
Pounds coal to one ton of load	22.61	27.14	22.96	26.12
Pounds water evaporated to one pound coal	6.47	6.86	7.13	6.32
State of weather	Clear.	Clear.	Clear.	Clear.
Cause of delay	None.	None.	Heavy train, doubled four miles.	None.

Results.—Trip No. 1 shows compound engine consumed 16 per cent. less coal to one ton of load, and evaporated 6 per cent. less water to one pound of coal than engine No. 145.

Trip No. 2 shows compound engine consumed 12 per cent. less coal to one ton of load, and evaporated 12.8 per cent. more water to one pound of coal than engine No. 145.

TABLE NO. 2.

Performance of Engines Nos. 147 and 145. Freight Service Between Monterey and Saltillo, Distance of 67.8 Miles. Average Grade, 1.75 per cent.

INDIAN TERRITORY COAL.

Number of trip	3	3	4	4
Number of engine	147	145	147	145
Hours on trip	6:40	6:10	6:10	6:10
No. of cars in train	12	9	8	14
Total weight of train, including engine and tender, in tons of 2,000 lbs.	271.00	231.85	217.33	226.10
Pounds coal consumed	6,230	6,169	4,687	6,370
Pounds water used	43,395	41,383	35,635	42,532
Pounds coal to one ton of load	22.98	26.60	21.56	28.17
Pounds water evaporated to one pound coal	6.96	6.70	7.60	6.67
State of weather	Clear.	Clear.	Clear.	Clear.
Cause of delay	Heavy train, doubl'd four miles.	None.	None.	None.

Trip No. 3 shows compound engine consumed 14 per cent. less coal to one ton of load and evaporated 3.8 per cent. more water to one pound of coal than engine No. 145.

Trip No. 4 shows compound engine consumed 23.4 per cent. less coal to one ton of load and evaporated 14 per cent. more water to one pound of coal than engine No. 145.

TABLE NO. 3.

Performance of Engines Nos. 147 and 145. Freight Service Between Monterey and Saltillo, Distance of 67.8 Miles. Average Grade 1.75 per cent.

INDIAN TERRITORY COAL.

Number of trip	5	5	6	6
Number of engine	147	145	147	145
Hours on trip	6:10	6:10	6:10	
No. of cars in train	11	11	8	Only two or three cars in train; no data taken.
Total weight of train, including engine and tender, in tons of 2,000 lbs.	251.66	258.91	229 6	
Pounds coal consumed	5,179	7,692	4,839	
Pounds water used	40,521	46,843	37,647	
Pounds coal to one ton of load	20.57	29.70	21.07	
Pounds water evaporated to one pound coal	7.82	6.08	7.77	
State of weather	Clear.	Clear.	Clear.	
Cause of delay	None.	None.	None.	

Results.—Trip No. 5 shows compound engine consumed 31 per cent. less coal to one ton of load and evaporated 28 per cent. more water to one pound of coal than engine No. 145.

arrangement of the frames, the former having them located outside of driving wheels and the latter inside.

There has been more or less criticism as to the manner in which tests of the various tyes of compound engines have been made claiming, and with some truth, that the best enginemen and firemen are selected to handle them and that every attention is given to their economical operation by those interested, while but little interest is manifested in the simple engine placed in competition. On this account care was taken that neither of the engines in the test should have any advantage over the other in the selection of men or otherwise. Previous to the test the three engines were taken into the shops and their flues removed, boilers thoroughly cleansed and all necessary repairs made to put them in equally good order, and no changes were made in the men who run them for months previous.

It is hardly necessary to go into detail as to how the tests were conducted; suffice to say that proper facilities were at hand to accurately measure and weigh the fuel and water. A competent mechanic and engineman accompanied the engines on each trip, whose duty it was to weigh and measure the fuel and water, weigh each car and load and take observations generally.

The test of engines 147 and 145 in freight service was made on a mountain portion of the road between Monterey and Saltillo, a distance of 67.8 miles over almost a continuous ascending grade of 1.75 per cent. The test in passenger service with engines 147 and 133 was made on San Luis Division between Saltillo and San Luis Potosi, a distance of 242 miles; southward 25 miles of which is a continuous 2 per cent. ascending grade and about 25 miles of a 1 per cent., the remainder being a varying ascending and desceding grade of about ⅛ per

TABLE NO. 4.

Performance of Engines Nos. 147 and 145. Freight Service Between Monterey and Saltillo. Distance of 67.8 miles. Average grade, 1.75 per cent.

PECOS COAL.

Number of trip	7	7	8	8
Number of engine	147	145	147	145
Hours on trip	8:55	6:10	6:10	6:10
No. of cars in train	9	9	9	11
Total weight of train, including engine and tender, in tons of 2,000 lbs.	232.95	216.45	237.79	265.34
Pounds coal consumed	6,893	7,511	6.948	9,319
Pounds water used	39,659	45,406	38,222	50,004
Pounds coal to one ton of load	29.59	34.70	29.21	35.12
Pounds water evaporated to one pound coal	5.75	6.04	5 00	5.36
State of weather	Clear.	Clear.	Clear.	Clear.
Cause of delay	Wait ing on other train.	None.	None.	None.

Results.—Trip No. 7 shows compound engine consumed 14.7 per cent. less coal to one ton of load and evaporated 5 per cent. less water to one pound of coal than engine No. 145. Trip No. 8 shows compound engine consumed 16.7 per cent. less coal to one ton of load and evaporated 7 per cent. less water to one pound of coal than engine No. 145.

TABLE NO. 5.

Performance of Engines Nos. 147 and 145. Freight Service Between Monterey and Saltillo. Distance of 67.8 Miles. Average Grade, 1.75 per cent.

PECOS COAL.

Number of trip	9	9	10	10
Number of engine	147	145	147	145
Hours on trip	6:10	6:10	7:10	6:10
No. of cars in train	9	9	12	7
Total weight of train, including engine and tender, in tone of 2,000 lbs.	236.98	227.43	222.24	197.45
Pounds coal consumed	6,458	7,481	7,005	5,900
Pounds water used	38,222	41,096	44,257	35,635
Pounds coal to one ton of load	31.20	32.89	31.51	29.88
Pounds water evaporated to one pound coal	5.91	5.49	6.31	6.03
State of weather	Clear.	Clear.	Clear.	Clear.
Cause of delay	None.	None.	One hour at Monterey.	None.

Results.—Trip No. 9 shows compound engine consumed 5.1 per cent. less coal to one ton of load and evaporated 7.6 per cent. more water to one pound of coal than engine No. 145. Trip No. 10 shows compound engine consumed 5.4 per cent. more coal to one ton of load and evaporated 4.6 per cent. more water to one pound of coal than engine No. 145.

Note.—Trip No. 10, engine 145, inspector reports train as pulling very light.

TABLE NO. 6.

Performance of Engines Nos. 147 and 145. Freight Service Between Monterey and Saltillo. Distance of 67.8 miles. Average Grade, 1.75 per cent.

PECOS COAL.

Number of trip	11	11	12	12
Number of engine	147	145	147	145
Hours on trip	6:20	6:10	6:10	
No. of cars in train	11	9	9	Only three or four cars in train; no data taken.
Total weight of train, including engine and tender, in tons of 2,000 lbs.	252.39	254.38	226.20	
Pounds coal consumed	8,131	9,244	6,835	
Pounds water used	42,532	50,004	38,509	
Pounds coal to one ton of coal	32.21	36.33	30.21	
Pounds water evaporated to one pound coal	5.23	5.40	5.63	
State of weather	Clear.	Clear.	Clear.	
Cause of delay	Broken dr'wbar.	None.	None.	

Results.—Trip No. 11 shows compound engine consumed 11.3 per cent. less coal to one ton of load and evaporated 3.1 per cent. less water to one pound of coal than engine No. 45.

Coal Summary for 10 Trips made by Engine No. 147, Freight Service.

Total weight of cars and lading in tons	1,802 49
Total amount of coal consumed in pounds	63,161
Pounds of coal to one ton of load	35.04

For 10 Trips made by Engine No. 145, Freight Service.

Total weight of cars and lading in tons	1,751.14
Total amount of coal consumed in pounds	72,296
Pounds of coal to one ton of load	41.29
Indicated saving in favor of compound	17.83%

Note.—Compound engine did not do as wel comparatively with the Pecos as with the Indian Territory coal. The above includes five trips each with Territory and Pecos coal.

WATER SUMMARY.

Compound Engine No. 147 with Indian Territory & Pecos Coal in Freight Service. Ten Trips.

Total coal consumption in pounds	74,835
Total amount of water evaporated in pounds	401,853
Pounds of water evaporated to one pound of coal	6.37

Ten-wheel Engine No. 145 with Indian Territory & Pecos Coal in Freight Service. Ten trips.

Total coal consumption in pounds	82,864
Total amount of water evaporated in pounds	435,897
Pounds of water evaporated to one pound of coal	6.02

cent. Northward we have about 65 miles of a 1 per cent. grade and, minus the down grade as indicated above, the grade on balance of the line will not average over ½ per cent.

THOS. MILAN,
Supt. Motive Power and Machinery.

TEST OF COAL.

As it was desired by all concerned to know the value of the coal from the mines adjacent to Laredo, termed Pecos, as compared with that of the Indian Territory, a test of six trips each was made with the compound engine and simple engine on the Territory and Pecos coal with results as shown below.

The tests would indicate that we have been using Pecos coal at a loss, as compared with the Territory coal, should we take into account the cost of the additional boiler and flue repairs the Pecos coal entails, to say nothing of the poor service on the road occasioned by delays due to insufficient steam, cleaning fires, etc.

COMPARATIVE TEST.

Indian Territory & Pecos Coal with Baldwin Compound Engine No. 147. Six Trips.

INDIAN TERRITORY COAL.

Total weight of cars and lading in tons of 2,000 lbs	1,119.74
Pounds of coal consumed	32.565
Pounds of coal to one ton of load	29.08

PECOS COAL.

Total weight of cars and lading in tons of 2,000 lbs	1,018.55
Pounds of coal consumed	42.270
Pounds of coal to one ton of load	41.49

COMPARATIVE VALUE OF COAL DELIVERED AT SALTILLO.

Indian Territory over Pecos coal in execution	42.6%
Cost of Indian Territory coal at Laredo, per ton	$5.60
Cost of Pecos coal at Laredo, per ton	3.75
Amount of Indian Territory coal required at Saltillo monthly in tons	1,000
Amount of Pecos coal required at Saltillo monthly in tons	1,426
Cost of 1,000 tons of Indian Territory coal at $5.60 per ton	$5,600.00
Cost of 1,423 tons of Pecos coal at $3.75 per ton	5,347.50
Cost of hauling 426 tons of Pecos coal from Laredo to Saltillo, distance of 236 miles, at one-half cent ton mile	502.68
Cost of monthly supply of Pecos coal at Saltillo	5,850.18
Cost of monthly supply of Indian Territory coal at Saltillo	5,600.00
In favor of Indian Territory coal	$250.18

COMPARATIVE TESTS.

Indian Territory & Pecos Coal With Simple Ten wheel Engine No. 145. Six Trips.

INDIAN TERRITORY COAL.

Total weight of cars and lading in tons of 2,000 lbs	1,063.74
Pounds of coal consumed	37.981
Pounds of coal to one ton of load	35.72

PECOS COAL.

Total weight of cars and lading in tons of 2,000 lbs	933.81
Pounds of coal consumed	44,883
Pounds of coal to one ton of load	48.01

COMPARATIVE VALUE OF COAL DELIVERED AT SALTILLO.

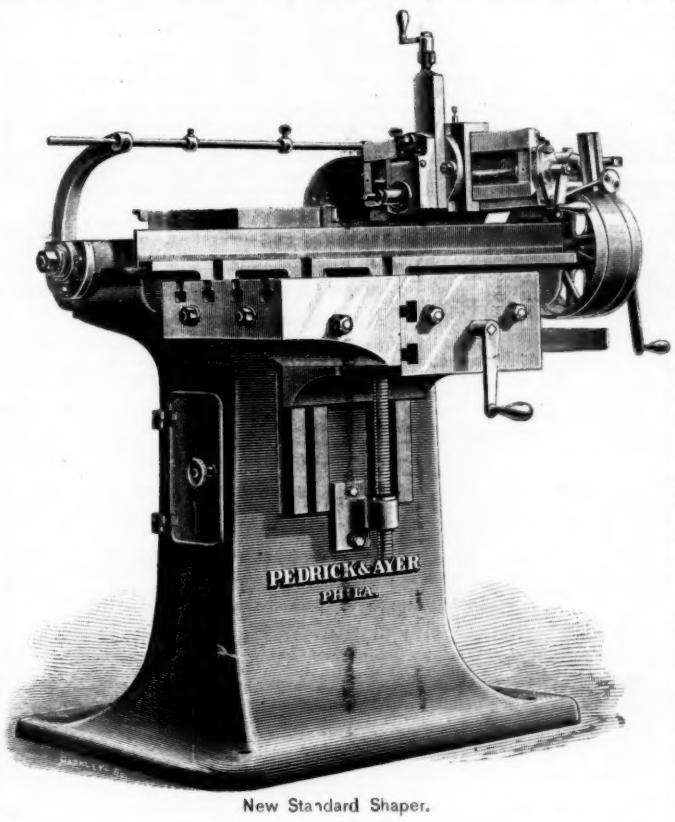
Indian Territory over Pecos coal in execution	34.1%
Cost of Indian Territory coal at Laredo, per ton	$5.60
Cost of Pecos coal at Laredo, per ton	3.75
Amount of Indian Territory coal required at Saltillo monthly in tons	1,000
Amount of Pecos coal required at Saltillo monthly in tons	1,344
Cost of 1,000 tons of Indian Territory coal at $5.60 per ton	$5,600.00
Cost of 1,344 tons of Pecos coal at $3.75 per ton	5,040.00
Cost of hauling 344 tons of Pecos coal from Laredo to Saltillo, distance 236 miles at one-half cent ton mile	405.32
Cost of monthly supply of Pecos coal at Saltillo	5,445.92
Cost of monthly supply of Indian Territory coal at Saltillo	5,600.00
In favor of Pecos	$154.08

The marked difference in the water and coal consumption of a few of the trips as compared with the tonnage can only be accounted for by the difference in the condition of the cars and running of the trains, and in one case a change of enginemen; firemen were also changed several times. It is evident from the tests made on San Luis Division that the compound, as it is, is not suitable for passenger service, while with slow time on heavy grade in freight service economy is indicated.

A New Shaping Machine.

We herewith illustrate a new "standard shaper," manufactured by Pedrick & Ayer, of Philadelphia. It is a column machine, and planes 12 in. in width by 30 in. in length. It has an adjusting table 14½ in. long and 14½ in. wide, and an auxiliary table, 11 in. long, to bolt to same when a longer one is desired. This smaller table, when taken off, leaves an angle plate to bolt long pieces against the table proper. The table is raised and lowered by crank and screw, with gibs that keep it to a true movement in its vertical travel. The tool slide has a down hand-feed movement of 6 in. and a power cross feed; it is on a swivel base, so that angle work can be planed. The machine is driven by 12-in. pulleys and has a 2-in. double thread screw to give the desired cutting speed, with a quick return, two and a half times as fast as cutting speed. It has a locking device for holding the tool slide solid while sliding down or doing angular work. On the sliding head, in front of the operator, is a light cast-iron cover that forms a tool shelf for keeping the cutting tools: on the square tables there is another shelf for wrenches, oil can, waste, etc., both being convenient and useful.

The tool cuts at the same speed whether on long or short work; there is no varying of speed at all points of travel as is the case with crank movements, and the screw gives the tool a regular smooth cutting speed, producing the best surface on all metals. Water-cuts on iron or steel can be taken, and as good results obtained as when water turning is done on a lathe. The stroke of machine can be altered and readily adjusted while running, and it will take cut and reverse in 1½ in. The belts run at high speed with positive cams operating them, and the belt shifters enable the machine to work up to a close line either way. All bearings are self-oiling and are bushed with bronze; the loose pulleys are self-oiling with bronze bushings. The tool is of high grade and is intended to take the place of a 25 to 30-in. shaper of old style.



New Standard Shaper.

Train Accidents in the United States in October.

COLLISIONS.

REAR.

6th, on Norfolk & Western, near Ceredo, W. Va., a passenger train ran over a misplaced switch and collided with some flat cars, 4 of which and the engine were wrecked. Fireman killed and 2 passengers injured.

7th, on Texas & Pacific, at Mineola, Tex., the caboose of a switching freight train was struck by another freight, doing some damage and killing a tramp.

10th, on New York Central & Hudson River, near Hyde Park, N. Y., a freight train broke in two and the rear portion was run into by a following freight. The engine was badly damaged, several cars were thrown into the Hudson River and the caboose and one car were burned. Engineer and 2 brakeman killed and fireman badly injured.

13th, on Richmond & Danville, near Rapidan, Va., a freight train broke in two and the rear section ran into the forward one, wrecking a number of cars and injuring a brakeman.

14th, on Cleveland, Cincinnati, Chicago & St. Louis, at White Sulphur Station, O., a westbound passenger train struck the rear of a freight train going upon a side track, disabling the engine and wrecking 5 freight cars. Engineer slightly injured.

14th, on Great Northern, at Anoka, Minn., a freight train standing in the yard was run into by a following freight, wrecking a locomotive and 15 cars and slightly injuring two trainmen and a man in the caboose. It is said that the crew of the standing train had left it to go for refreshments.

15th, on Central of New Jersey, near Hopes, Pa., a freight train which had come to a standstill was run into by a following freight. Engine, caboose, half a dozen box cars and 10 coal cars wrecked. The wreck took fire from the firebox of the engine.

18th, on Baltimore & Ohio, near Chicago Junction, O., a passenger train was run into at the rear by a freight train, damaging the rear coach and derailing several freight cars. Conductor and one passenger injured.

19th, on Birmingham Mineral, at McAdorys Switch, Ala., a freight train ran into the rear of another freight, damaging engine, caboose and 3 cars and injuring 3 trainmen.

20th, on Chicago, Milwaukee & St. Paul, at Coon Siding, Ia., a passenger train ran over a misplaced switch and into the rear of a freight train standing on a side track, damaging the locomotive and caboose. Express messenger and a drover riding in the caboose were injured.

21st, on Central of New Jersey, near Bound Brook, N. J., a long coal train broke in two and the detached section afterwards collided with great force, wrecking about 40 cars. Several trainmen slightly injured.

21st, night, on New York Central & Hudson River, at Tribes Hill, N. Y., a freight train ran into the rear of another freight which had stopped on a curve, wrecking engine, caboose and several cars. The wreckage caught fire from the caboose stove and was burned up. Fireman injured.

22d, on McKeesport & Youghiogheny, at Round Bottom, Pa., a freight train ran into the rear of a preceding freight, doing considerable damage and killing an engineer and a brakeman.

22d, on Union Pacific, near Falls Leaf, Kan., a Chicago, Rock Island & Pacific freight train broke in two and the detached sections collided, wrecking 12 cars. A brakeman was injured.

23d, on Western Maryland, near Owing's Mills, Md., a freight train ran into the rear of another freight, doing slight damage. The caboose was set afire by the overturning of the stove but the flames were promptly extinguished. Engineer seriously injured.

23d, on Pennsylvania, near Cresson, Pa., a freight train ran into the rear of another freight; wrecking an engine and 15 cars. Fire broke out and a number of cars were destroyed. One trainman injured.

26th, 9:30 p. m., on Minneapolis, St. Paul & Sault Ste. Marie, at Thorson, Minn., a way freight standing at the station was run into at the rear by an extra freight, completely wrecking the caboose. Six passengers in the caboose were killed and 3 injured. The extra was running at high speed contrary to orders.

26th, on Pennsylvania road, at Iselin, N. J., an eastbound freight train moving about 6 miles an hour was run into by a following freight running about 8 miles an hour. One car was thrown over upon the adjoining track and a westbound train struck it, but was not seriously damaged. The foremost train had slackened so that the engineer could go into the office to inquire about a doubtful signal which he had just passed. One trainman injured.

29th, 5 a. m., on Cincinnati, New Orleans & Texas Pacific, near the north end of the bridge over the Ohio, at Cincinnati, a switching engine ran into 3 freight cars standing on the main track, badly damaging the cars and engine, and injuring a brakeman.

29th, on Central of New Jersey, near Plainfield, N. J., a freight train broke in two, and the parts afterward ran together, making a bad wreck. A brakeman was fatally injured.

31st, on Illinois Central, at Dongola, Ill., a freight train ran over a misplaced switch and into the rear of another freight standing on the side track, wrecking a caboose and badly injuring the conductor, who had been taken ill, and was lying in the caboose.

And 42 others on 30 roads, involving 4 passenger and 69 other trains.

BUTTING.

1st, on Savannah, Americus & Montgomery, near Abbeville, Ga., butting collision between two freight trains, damaging both engines. Two passengers in one of the cabooses were slightly injured.

1st, night, on Cleveland & Pittsburgh, at Kensington Tower, O., as a west bound freight was approaching a siding upon which an east bound freight was standing, a telegraph operator threw a switch by mistake, causing a collision in which both engines and 7 cars were wrecked. A trainman was killed.

2d, on Pennsylvania, at Tombicken, Pa., collision between two passenger trains at a meeting point, disabling the engines. Three trainmen and one passenger injured. One of the trains approached the station uncontrolled.

3d, on Louisville & Nashville, near Swift Creek, Ala., butting collision between a mixed train and a freight, injuring a fireman.

5th, on Northern Pacific, in a tunnel near Easton, Wash., butting collision between two freights due apparently to an operator's mistake. Four engines were badly wrecked and a tramp was killed.

8th, St Louis, Arkansas & Texas, at Kingsland, Ark., butting collision between a passenger train and a freight train, wrecking both locomotives and killing the freight engineer and a brakeman.

11th, on Philadelphia & Reading, near Thomaston Colliery, Pa., butting collision between two freight trains caused by the man in the signal tower confusing signals, piling up 3 engines and about 30 cars in a pretty bad wreck. One trainman killed and 3 injured.

15th, on New York, Lake Erie & Western, at Weehawken, N. J., butting collision between a freight train entering the yards and a coal train, damaging both engines and a number of cars. An engineer and a fireman were slightly scalded by escaping steam.

16th, on Illinois Central, near Ullin, Ill., butting collision between two freights, making a pretty bad wreck. Fireman injured by jumping. The crew of the southbound freight, which had orders to meet a northbound passenger train and a freight train at Ullin, apparently forgot about the freight.

16th, at 6:30 a. m., on Pittsburgh, Cincinnati, Chicago & St. Louis, at Mingo Junction, O., butting collision between an eastbound express train and a freight train on a gauntlet track, wrecking the forward portion of both trains. A brakeman and an express messenger were killed and 3 postal clerks and a baggageman were injured. The wreck of the baggage and postal cars took fire and was burned up. The gauntlet or interlaced track is about 1,800 ft. long and the switch is at the west end. The block signal is at the tower located at the west end and is interlocked with the switches and with a rail circuit which holds it at danger while a train is on either track in any part of the gauntlet. The operator went to sleep leaving the signal right for westbound trains. The eastbound engineer failed to observe either of the two signals set against him. There was a dense fog at the time.

19th, on Wabash road, near Versailles, Ill., butting collision on a curve between a passenger train and a freight train, making a pretty bad wreck. Both engineers were badly hurt. The freight was running against orders.

21st, on Illinois Central, at Bardwell Hill, Tenn., butting collision between two freight trains, wrecking the forward ends of both. The wreck was fired by the explosion of an oil car and 3 cars were destroyed. One of the engineers was badly injured. Fire was also communicated to adjacent woods and many acres of timber land were burned over.

21st, on Wabash road, near Forest Hill, Ill., butting collision between a passenger train and a work train, wrecking both locomotives. Two passengers were seriously injured.

22d, night, on Chicago & Northwestern, near Lake City, Ia., butting collision between two freights on a curve, making a very bad wreck. Two trainmen killed and 3 injured, two of them fatally.

22d, 3 a. m., on Pennsylvania road, at Mont Clare, Pa., butting collision between freight trains, wrecking two engines and derailing 17 cars. A brakeman and a fireman were injured. The collision was due to a misplaced switch at the end of double track. The switches

on this division (the Schuykill) are provided with distant signals, but the lamp of one of the signals had become extinguished and the switch tender was using a hand signal.

22d, on Kansas City, St. Joseph and Council Bluffs, near Murray's Station, Mo., butting collision between a passenger train and a freight train, wrecking both engines. Engineer and two other trainmen injured. It appears that the passenger train had orders to meet a freight at Murray's. A freight train was standing on a siding when the passenger train arrived, and the engineer, supposing it to be the train he had orders to meet, did not stop.

23d, on Chicago & Northwestern, near Dayton, Ia., butting collision between two freights, due to a dispatcher's mistake, making a bad wreck, in which 2 trainmen were killed and 2 injured.

24th, on New York, Lake Erie & Western, at Avon, N. Y., a passenger train struck a misplaced switch and ran into the head of a freight train standing on a siding, badly damaging both locomotives and wrecking one end of the express car. Three trainmen injured, 2 of them fatally.

26th, 7 p. m., on Union Pacific, near Millard, Neb., butting collision between eastbound passenger train No. 44 and an empty engine running west, making a bad wreck. The engineer of the empty engine was killed and the other engineer and a fireman injured.

27th, on Farmville & Powhatan road, near Powhatan Courthouse, Va., butting collision between a passenger train and a mixed train, wrecking both engines and injuring 4 trainmen.

29th, on Chicago, St. Paul, Minneapolis & Omaha, near Tramway, Wis., butting collision between a passenger train and a freight train, wrecking the engines and several cars loaded with cattle and badly damaging 3 baggage cars. A brakeman and a drover were injured. It is said that the passenger train disregarded orders.

31st, on Nashville, Chattanooga & St. Louis, at Bosley Springs, Tenn., butting collision between freight trains 58 and 63, badly damaging the engines and 7 freight cars. Two employés were injured. It is said that the men in charge of train 58 forgot about the meeting point of the other train.

And 10 others on 9 roads, involving 2 passenger and 18 other trains.

CROSSING AND MISCELLANEOUS.

1st, night, at the junction near Alliance, O., a Cleveland & Pittsburgh switching freight collided with an Erie, Alliance & Southern engine, which was overturned and badly damaged. Engineer and fireman severely injured.

2d, on New York & New England, at Bristol, Conn., a passenger train collided with a freight train which was occupying the main track on the passenger train's time, doing some damage and badly injuring a baggage master.

2d, at a crossing in Chicago, Ill., owing to careless signaling, an Illinois Central passenger train was run into by a Lake Shore & Michigan Southern freight, wrecking the freight engine and one car and overturning a mail car and injuring a trainman. The engineer of the passenger train succeeded in detaching his locomotive and getting out of the way.

3d, on Cincinnati, Hamilton & Dayton, near Dayton, O., a southbound passenger train collided with an engine, which was derailed and thrown to one side, but not sufficiently to clear the cars, the sides of all of which were badly scraped.

5th, on Chicago, Rock Island & Pacific, near Leavenworth, Kan., collision between passenger trains, due to a mistake in signaling, damaging both engines and several cars. Two passengers injured.

12th, near Shakopee, Minn., collision between Minneapolis & St. Louis and Chicago, St. Paul, Minneapolis & Omaha freight trains, smashing both engines and killing a fireman.

15th, on Philadelphia & Reading, near Bellefonte, Pa., collision between passenger trains, doing some damage and slightly injuring a number of passengers.

29th, on Cincinnati, Hamilton & Dayton, at Boyer's Junction, O., an officers' inspection train was backed into the rear of a freight train, wrecking the car and injuring several officers.

29th, at Taopi, Minn., a Chicago, St. Paul & Kansas City passenger train which had just started from the station was struck at the crossing of the Chicago, Milwaukee & St. Paul by a freight train of the latter road. The passenger was moving about 8 miles an hour and the freight about 15 miles an hour. The engines and baggage car were badly damaged, a tramp was killed and 2 firemen and an engineer injured.

And 16 others on 15 roads, involving 5 passenger and 24 other trains.

DERAILMENTS.

DEFECTS OF ROAD.

13th, on Missouri Pacific, near Coffeyville, Kan., a passenger train was thrown from the track by the spreading of the rails, injuring an express messenger and 1 passenger.

24th, on Kansas City, Fort Scott & Memphis, near Pearson Creek, Mo., several cars of a freight train were derailed by a broken rail and ran upon a bridge, knocking it down and wrecking 15 cars, mostly empty. A tramp was slightly injured.

24th, on Central of Georgia, near Goodwater, Ala., a coal train ran upon a burning trestle and 11 cars and the caboose broke through, falling about 50 ft. The wreck took fire and the conductor and 1 brakeman were killed and their bodies burned up. The engineer was severely burned in trying to rescue the trainmen.

26th, on Atlantic & Pacific, at Pineveta, Ariz., a passenger train running at 40 miles an hour was derailed by a broken rail, 2 passenger and 2 baggage cars being overturned and thrown down a bank. Several passengers and an express messenger were injured.

26th, on Birmingham & Atlantic, near Ragan, Ala., a passenger train consisting of 1 carload of cotton and 2 passenger cars, ran upon a burning trestle and the whole train except the engine was overturned. The trestle was only 4 ft. high, but the wreck took fire and was totally destroyed. The passengers all got out unharmed most of them climbing through the windows. The engineer and conductor were somewhat injured. The trestle had been set afire by a tramp, apparently through carelessness. It is believed to have been burning only 10 minutes when the train came upon it.

29th, on Central of Georgia, near Summerfield, Ga., passenger train No. 2 was derailed, several passenger cars being overturned. They contained a large number of passengers, but only 13 were injured. It is said that there was a broken rail which the train had been ordered to look out for. It appears that the speed had been reduced, but not enough.

30th, on Ultima Thule, Arkadelphia & Mississippi, near Daleville, Ark., the caboose, in a mixed train, jumped the track and several cars were derailed and thrown down a bank. The superintendent of the road in jumping from the passenger car was caught in the wreck and crushed to death. Several passengers were injured. It is said that the train was running slowly and was derailed by a slivered rail.

And 14 others on 13 roads, involving 2 passenger and 12 other trains.

DEFECTS OF EQUIPMENT.

1st, on New York Central & Hudson River, at Irvington, N. Y., a car of a passenger train was derailed by a broken truck, a number of passengers being bruised. At the same time the engine blew out a cylinder head.

8th, on New York, Lake Erie & Western, near Ridgewood, N. J., as a passenger train, consisting of engine and one coach containing employés, and a freight train were passing each other, a car of the freight train was derailed by a broken wheel and thrown in front of the other train, wrecking the engine and a number of freight cars. Fireman killed and engineer and brakeman injured.

27th, on Chicago, Rock Island & Pacific, near Joliet, Ill., a freight train was derailed by a broken truck, wrecking 8 or 10 cars. Three tramps injured.

And 12 others on 12 roads, involving 1 passenger and 11 other trains.

NEGLIGENCE IN OPERATING.

1st, on Cleveland, Cincinnati, Chicago & St. Louis, at Carrollton, O., a work train moving backward ran over a hand car, upsetting the caboose and wrecking it and several cars. Conductor killed and 7 employés injured.

15th, on Chicago & Eastern Illinois, at Crete, Ill., a passenger train ran over a misplaced switch and crashed into a roundhouse, a portion of which fell upon and crushed the cab of the locomotive. The engineer and 3 newspaper reporters riding on the engine were killed and the fireman slightly injured.

21st, on Chicago, Burlington & Quincy, near Monmouth, Ill., a passenger train ran upon a switch which was not completely fastened, and which it is claimed had been tampered with; the engine and forward cars ran upon the siding and the remainder of the train kept the main track, all but the rear sleeping car being overturned and badly wrecked. The engineer, a traveling engineer and 2 passengers (one of them on the platform) were killed; and the fireman and 19 passengers were injured, some of them seriously.

23d, on East Tennessee, Virginia & Georgia, near Lodiga, Ala., the engine and several cars of a freight train were derailed and ditched by a misplaced switch. Engineer and fireman injured by jumping.

And 7 others on 7 roads, involving 1 passenger and 6 other trains.

UNFORESEEN OBSTRUCTIONS.

12th, night, on Atlantic & Pacific, near Navajo Springs, N. M., a freight train ran over a cow and the engine and 3 cars were derailed and ditched. Engineer and fireman injured.

12th, on Central Pacific, near Colfax, Cal., a passenger train was derailed at a point where rail fastenings had been maliciously removed. A sleeping car was thrown down an embankment severely injuring a porter and 3 passengers.

14th, on Boston & Maine, at East Cambridge, Mass., 3 cars of a freight train were derailed by running over a brakeman who had fallen between the cars. The man was killed.

15th, on New York, New Haven & Hartford, at Meriden, Conn., 2 cars of a freight train were derailed by running over a man who slipped and fell under the cars in attempting to board the train.

22d, on New York Central & Hudson River, near Frankfort, N. Y., an eastbound freight train ran into some wreckage which had been thrown in front of it by a derailed freight on the adjoining track, derailing and damaging the engine and forward cars.

And 3 others on 3 roads, involving 1 passenger and 2 other trains.

UNEXPLAINED.

5th, on San Antonio & Aransas Pass, near Shellbank, Tex., 4 cars of a freight train were derailed and several passengers slightly injured.

10th, on Cleveland, Cincinnati, Chicago & St. Louis, near Martinsville, Ind., the forward cars of a passenger train were derailed, injuring several trainmen.

13th, on Denver & Rio Grande, at Diamond Creek, Utah, a car of a freight train loaded with stone was derailed at a curve and overturned, killing a brakeman.

14th, on Baltimore & Ohio, near Hicksville, O., eastbound passenger train No 8 derailed while running at high speed, the passenger cars being thrown over an embankment. Two passengers were killed and 5 were injured. The Vice-President of the road, Thomas M. King, whe was in his private car at the rear end of the train, was slightly injured. The officers of the road, who searched for the cause of the derailment, say that the track was in perfect line and surface, well ballasted and properly gauged, and that no defect was found in the cars of engine.

19th, on Atchison, Topeka & Santa Fé, near Derby, Kan., a locomotive carrying a wrecking gang was derailed and overturned in the ditch. Two employés were killed and the engineer and two other employés seriously injured.

21st, on Baltimore & Ohio, near Sir John's Run, W. Va., an eastbound passenger train was derailed on a curve, and the forward portion badly damaged. Engineer and fireman killed and two postal clerks badly injured.

26th, on Houston, East & West Texas Road, at Colmesneil, Tex., engine and two cars of a freight train were derailed and conductor badly damaged.

29th, on Atchison, Topeka & Santa Fé, near Kenneysville, Tex., freight train No. 83 derailed, making a bad wreck. Three trainmen injured.

And 23 others on 24 roads, involving 6 passenger and 23 other trains.

OTHER ACCIDENTS.

10th, on Houston & Texas Central, near Bryan, Tex., a car of a freight train loaded with cotton took fire and seven cars, together with a bridge on which the train was stopped for the purpose of fighting the fire with water from the stream below, were burned up.

12th, on Central of New Jersey, near Bound Brook, N. J., the engine of a westbound passenger train was damaged by striking a wagon load of lumber which had got stuck on a crossing and had been abandoned by the driver, who succeeded in saving his horses.

A Philadelphia & Reading express train running parallel to the one mentioned in the preceding paragraph also struck the same obstruction and was disabled so that another engine had to be procured. Both trains had been brought partially under control before striking the wagon.

16th, on Allegheny Valley road, near Kittanning, Pa., a passenger train struck a threshing machine which had got stuck on a crossing and which had been abandoned by the driver. The locomotive was considerably damaged and the engineer was injured by jumping.

19th, on Philadelphia & Reading, near St. Clair, Pa., the engine of a freight train was badly wrecked by the explosion of its boiler, killing 3 trainmen and fatally injuring another. It is said that the engine had just left the shops.

21st, on St. Louis, Iron Mountain & Southern, near Moark, Ark., the engine of a moving freight train exploded its boiler, and was completely wrecked, and about a dozen cars piled on top of it. Fireman and brakeman killed, and engineer slightly injured.

And 7 others on 6 roads, involving 2 passenger and 5 other trains.

A summary will be found in another column.

Paints—Their Composition and Purity.*

As showing the inadvisability of using inferior qualities of paint the following illustration gives in a concise manner the reasons for improvement in this department of car manufacture, especially when one considers that one of the main objects of paint is the preservation of the material over which it is spread.

Suppose a small depot along the line requires 20 galls. of paint. If the material selected for this work was cheap, 75 cents per gallon, the cost would be $15; cost of application, $25, making a total cost of $40. Such a paint would last at most two years, or a cost of $20 per year for this station.

Now suppose the material selected for this station was the best paint. Twenty gallons would cost, at $1.50 per gallon, $30; the cost of application the same as that of the cheap material, $25, making a total cost for the best paint of $55. Suppose it lasts but three years, we would have a cost of $18.33 per annum for good paint and $20 per annum for cheap paint.

What, therefore, becomes the main safeguard for that all important quality, durability? The use of that which thus far has proved most effective against the elements—pure linseed oil. That is the life of a paint and cannot be supplanted by fish oil, rosin oil, emulsions, soap mixtures and the like.

At this stage the question as to the advisability of the use of ready mixed paints may be out of place, but the paints are worthy of a passing notice.

Very often painters encounter streaked jobs, not to speak of the many other ills. This in many cases is due to the fact that without the proper facilities, even with the utmost care exercised, the coloring pigment is not sufficiently or properly incorporated with the base. This most desirable feature is and can only be obtained by proper and specially constructed machinery.

As to coach colors, or more properly passenger car body or truck colors, more than the ordinary care in selection must be exercised, for if the vehicle employed in them is defective even to the smallest degree all that covers these colors, such as rubbing and finishing varnishes, is lost, and these are but small items compared with the heavy cost of experimenting, applying labor, etc. How much more will a car cost finished with the best make over one done with the cheapest material. Is a consumer warranted, for the sake of a few pennies, incurring the above mentioned heavy costs?

The next important feature in a paint or color is its beauty—its brilliancy; the next vital point is strength or covering capacity.

Many manufacturers place their entire force on the strength of their products, but either evade or lose sight of the fact that brilliancy of color or the productions of fine, soft, true tints is what the consumer wants. To use a strikingly forcible illustration, test, for instance, the Prussian blues. Some with white will produce a rich sky-blue tint, while others will show a decided dull blue or gray lampblack effect. The latter article will unquestionably stain more white.

Another important feature in paint is physical, *i. e.*, the consistency. A color that is ground stiff and in paste form is cheaper than the semi-liquid. The best way to understand this is by calculation.

Say a pound of car body color in good paste form costs 25 cents; compare this with an article that is semi-liquid and costs but 22 cents. To the former you can add ¼ lb. turpentine at a cost of 1½ cents, and make an article identical in consistency with the semi-liquid, and have 1¼ lbs. of paint at 26½ cents, or 21⅛ cents per lb., or a saving of $\frac{3}{16}$ cents per lb.

Does this not establish the fact then that that material, so ground, that will permit the introduction of turpentine, when the color is in the hand of the master painter, is a superior, more desirable article than that whose consistency, in semi-liquid, deprives the color of this necessary feature? You pay for turpentine in a semi-liquid color, and are compelled to work the color over after all, when in a pound of car body color in good paste form you introduce the turpentine as the color may require, thereby reducing the cost, as your color increases in quantity.

As the last but not least of all the durable features in paint appears "fineness of grinding." The advantages and economy of correctly ground paint are so striking that little need be said. We all know that a weaker pigment finely divided or ground is rendered as effective in covering capacity as a coarse ground article.

*Extracts from a Paper read before the Northwest Railroad Club, by J. P. Seyman.

Another Railroad Office Building in Chicago.

There is to be another railroad office building in Chicaga. It is known as the Monadnock, and is directly opposite the Post-Office near the Grand Pacific Hotel on the corner of Dearborn and Jackson streets. Four large railroad companies have already seeured a large proportion of the space. These roads are the Atchison, Topeka & Santa Fe; Michigan Central, Chicago & Alton, and the Chicago Terminal Elevated railroads. Since it has become generally known that these railroads are to move into this building, there is, as might be supposed, a rush of manufacturers dealing in railroad supplies to obtain offices there. There is a noticeable tendency in Chicago toward consolidation of allied interests in the matter of office buildings; for instance, the architects, contractors, and lumber men endeavor to get as close together as possible; and so it is with civil engineers, bridge builders, and contractors doing railroad work. The railroad centre is in and about the location of the Grand Pacific, and the Monadnock lies within that district. A description

of this building was given in the *Railroad Gazette* Oct. 30. It is 200 ft. long by 70 ft. wide. It is fire proof, of modern construction, with self sustaining exterior walls. The halls are finished in marble and glass with mosaic floors. All of the hardware on the lower floors, staircases and elevators, is made of aluminum. This building differs from most other office buildings in Chicago in having light on all sides, and has not an interior court. As a railroad centre, this building will soon be as well known as the "Rookery." There are eight elevators, part of which run through, without stopping, to the upper floors.

THE SCRAP HEAP.

World's Fair Notes.

The domes of the Administration Building will be covered with aluminum bronze.

The contract for the Illinois state building has been let to William Harley & Son, for $195,800.

There will be about 29 acres of glass skylights in the 12 principal buildings of the Exposition. The glass will be of uniform thickness 1/16ths of an inch, and will make about 120 carloads for the 12 buildings.

The subject of water transportation between the down town district and the Fair grounds is being brought forward in such a light that there is little doubt but that the facilities for this traffic will be of such ample nature as to solve in a large measure the perplexing problem.

The lowest bid for the iron work for the administration building was submitted by the Edgemoor Bridge Works, of Wilmington, Del. The price is 4.29c. per pound for 10,000,000 lbs., making a total of $429,000. There will be more iron work in this building than in any other on the grounds.

The Manufactures and Liberal Arts Building requires more than 200 car loads of lumber or 3,000,000 ft. for its flooring alone, and five car loads of nails to fasten it down. Three electric saws are kept ruuning night and day sawing and sizing the flooring. Twenty buildings of the size of the Auditorium, or 1,000 houses 25 × 50, could stand on this mammoth floor.

Mr. R. J. Gross, of the Brooks Locomotive Works, has just returned from a trip through England and Scotland, during which he visited the leading locomotive and railroad works. Mr. Gross was commissioned by the Department of Transportation Exhibits to secure information for the department. The London & Northwestern will make a large exhibit of locomotives and cars.

In reply to questions inquiries from intending German exhibitors, Solicitor-General Butterworth has given the assurance that there will be no infringement upon their rights as inventors, and that the statutes of the United States for the protection of patents are much more favorable than the laws of any foreign country on the same subject, and that so far as inventions are concerned, foreign exhibitors will be on equal footing with Americans.

It is now apparent that the Illinois Central will no longer have a monopoly of the passenger traffic between the city and the World's Fair grounds. After several months of negotiation the right of way has been gained between Seventy-fifth and Sixty-seventh streets for four tracks. The roads which may enter on these tracks are the Baltimore & Ohio, Pennsylvania, Lake Shore, Rock Island, Nickel Plate, Chicago & Grand Trunk, Santa Fe and others. One of the conditions under which these tracks are located is that they shall all be removed by August 1, 1894.

Medusaline, a new composition designed as a substitute for brick and building stone, has been adopted for the sidewalks and driveways in the Exposition grounds. The Committee on Grounds and Buildings granted the contract to the Medusaline Mfg. Co., of Chicago, for constructing 450,000 sq. ft. of sidewalks and driveways. The price is 6½ cents per sq. ft. The concrete composition to be used by the contractors is said to be as hard as perfect stone, and it is now thought probable that it will be used instead of staff for the exterior ornamentation of the Fine Arts Palace and several other buildings.

Traffic Manager Jaycox recently visited the Exposition grounds in company with a number of steamboat men for the purpose of examining the great pier so as to determine what facilities it affords for landing passengers from the steamboat fleet running between the city and Jackson Park. Those present agreed that the breakwater and pier now in place would be inadequate for the landing of passengers in any great number. They will probably be changed so as to allow more room between the outer breakwater and the pier, that steamers from the city can head in from the south, unload and return north without backing or turning, thus saving much time.

The South Park Commissioners have taken steps to have Drexel, Grand and Oakwood boulevards, leading to the Exposition grounds, brilliantly lighted with electricity. An electric plant, costing $75,000 to $100,000, and equal to supplying 300 arc lights, will be established. The Exposition authorities will illuminate with electricity the entire Exposition grounds, including Midway Plaisance. More than three times as much power will be required to run the dynamos as was used in all the departments of the Philadelphia Centennial show. Although the estimates have not been finished, the engineers have already provided for 20,000 arc lamps and fully 100,000 incandescent lamps. Twelve thousand of the latter will be used in the Fine Art Galleries alone.

Work has been recommenced on the electric building. The floor of this building was completed several weeks ago, but further work was delayed while the plans were revised by Supervising Architect Burnham. The form of the towers has been changed, and the proposed wooden trusses has been replaced with iron. The greater part of the material is on the ground, and the building will be rapidly pushed forward to completion. There are about 150 men now employed upon the building. The carpenters are still at work on the transportation building, and a large amount of the iron work for the 250-ft. dome is on the site. Two of the 60 ft. iron portals for the eight entrances to the building are in place and the columns for the other six are up. Iron work for all of the 56 trusses for the gallery roof of this building has been delivered and several tresses are in position. Material for the metal work of the dome of the administration building is on the ground and a derrick stands ready to hoist it into place. The horticultural building is still waiting for iron work. The salt water reservoir for the fisheries building is being built.

Bonds Listed on the New York Stock Exchange.

The Governing Committee of the Stock Exchange has listed for dealings the following securities:

Minnesota Iron Co.—An additional issue of $2,500,000 capital stock, making the total amount listed $16,500,000. The new issue is for payment for properties recently acquired. The authorized capital of the company is $20,000,000.

Atlantic & Pacific.—Additional $1,117,000 guaranteed four per cent. bonds, making the amount listed $18,727,000.

Oregon & California.—Additional $390,000 first mortgage bonds, issued on new construction. The amount listed is now $17,045,000.

Nashville, Florence & Sheffield.—Additional $176,000 first mortgage bonds, guaranteed by the Louisville & Nashville Railroad. This issue is to bring the total to the allowed rate of $20,000 a mile. The amount listed is now $2,096,000.

Chicago, Rock Island & Pacific.—Additional $1,470,000 extension and collateral trust bonds, issued for new construction of about 98¼ miles in the Indian Territory. Also a new issue of $2,000,000 five per cent. 30-year debenture bonds, dated Sept. 1. The bonds are issued in payment for terminals and for betterments. The authorized issue is $10,000,000.

Rome, Watertown & Ogdensburg.—Additional $2,021,000 consolidated five per cent. bonds, issued to retire prior bonds, making amount listed $9,081,000.

Chicago Elevated Railroads.

The Lake Street Elevated road in Chicago applied for and received from the City Council a rebate of the $100,000 deposited with the City of Chicago to secure a compliance with the conditions of the franchise granted to the road. They hope on receipt of this money to extend the line a short distance and commence operations.

Fall of a Bridge.

The west span of the Great Northern Railroad bridge over the North Fork of the Columbia River, six miles from Columbia Falls, Mont., fell on Saturday last, carrying with it nine men, three of whom were killed. Four others will doubtless die. The bridge was in course of construction and nearly completed. The span was 60 ft. long, and the men fell a distance of 84 ft. The accident will delay the extension of the Great Northern about two weeks.

Railroads at the Columbian World's Fair.

The Chief of the Department of Transportation Exhibits reports that a great interest is shown among railroad managers, and that there is every prospect of a magnificent display of all objects which will illustrate the the growth and development of the science of transportation. He says that the London & Northwestern Railway of England has decided to make an exhibit of its track, tools, appliances, equipment, etc. The chief of this department invites correspondence with railroad men and manufacturers, and is especially desirous of obtaining information regarding relics of the early days of railroads in this country.

Eight Passengers Killed at Toledo.

On the evening of Nov. 28, about 5 o'clock, the eastbound "Boston special" express of the Lake Shore & Michigan Southern was run into from behind at the tunnel under the Miami Canal, about a mile west of Toledo, by a Flint & Pere Marquette passenger train, wrecking the rear car and killing eight passengers. About 20 others were badly injured. Many of the injuries were from scalding, the whistle of the locomotive having been broken off in the collision. The trains of the Flint & Pere Marquette use the Lake Shore tracks for about two miles coming into Toledo, and it appears that the Boston express generally comes in behind the train which ran into it. On this occasion it was stopped by a freight train just east of the tunnel. It appears that the line from the junction to the Toledo station, about two miles, is practically all in the yard, and that therefore the time interval is not rigidly maintained. The rear brakeman of the Lake Shore train, whose car stopped a very short distance east of the tunnel (which is 75 ft. long), did not dare go into the tunnel because it was filled with smoke and he heard the F. & P. M. train coming. The runner of the latter claims to have seen nothing of the preceding train before he reached the tunnel. This, if he kept a good lookout, would indicate that the foremost train had been stopped some time, but on the other hand, the brakeman's story about the smoke would indicate that the time was short. The cars of the Lake Shore train all had Wagner vestibules except the last one, and the casualties were all in this rear car.

The "Zone" Tariff in Massachusetts.

A hearing was called before the Massachusetts Railroad Commissioners in Boston recently in order that the public might present its views on the zone system of railroad fares, but no one appeared in any other capacity than that of a listener, and the hearing was closed. Chairman Crocker announced that the Board would investigate the subject, and embody the results in the next annual report.

The Moving Sidewalk.

The moving sidewalk at the World's Fair grounds was opened to the public on Nov. 25. About 300 representative men went by special train from Chicago to inspect this novelty. One of the criticisms made of this means of transportation was with reference to the danger to old men, ladies and children, but experience from a week's use of the road shows that there is no trouble in this respect. The speed is so slow that there is no difficulty in getting on or off. This exhibit is on a wooden trestle 25 ft. high, the sharpest curve having a radius of 75 ft. The sidewalk is 900 ft. long, having 360 degrees of curvature in that length. When hauling about 350 passengers, which is about one-third of the capacity of this experimental line, the additional power expended is about 2½ H. P. over and above that necessary to move the walk. The road is now in full operation and is carrying a large number of passengers. A full view of the World's Fair grounds is obtained from the seats on the cars.

South American Railroads.

The Government of Bolivia is arranging for the construction of a railroad from La Paz, the capital, to the principal tributaries of the Amazon. This railroad, which will be about 60 miles in length, will afford Bolivia an outlet to Europe and the United States by way of the Atlantic Ocean.

Canadian Customs Returns.

According to the returns furnished by the Customs Department at Ottawa the Dominion Government has paid bounty upon 213,105 lbs. of pig iron manufactured in Canada, amounting to $300,350 during the last nine years. The recapitulation shows that the bounty was paid to the following firms: Londonderry Iron Co. (limited) 177,734 tons, Geo. McDougall 4,013 tons, John McDougall & Co. 29,048 tons, Canada Furnace Co. (limited) 177 tons, Hall Bros. 2,113 tons. Total, 213,105 tons. In 1883 Sir Charles Tupper in the Dominion Parliament predicted that in 1887, between the bounties and the enormous customs duties on foreign iron and steel, the iron industry in the Dominion would give employment within three years to 30,000 men. As a matter of fact the annual production of pig iron is less to-day than in former years, being only 25,000 tons.

The total value of steam engines, machinery, etc., imported into the British North American provinces from the United States during the nine months ending Sept. 30 last was $744,435, against $572,537 during the corresponding period of 1890.

During the nine months ending September last Canada imported 1,236,702 tons of coal from the United States, against 1,049,858 tons during the corresponding period of last year.

Fast Run on the Pennsylvania.

A special train on the Pennsylvania Railroad carrying a party of guests to the opening of a new hotel in Washington ran from Jersey City to Washington on Saturday last in 4 hours 11 minutes, the distance being 227 miles. The reports state that the change of engines at Gray's Ferry (Philadelphia) took five minutes, and that repairs to a brake caused a loss of six minutes at Baltimore, making the running time, exclusive of stops, 56¾ miles an hour. The train left Jersey City at 2.49 p. m., and ran to Trenton, 56 miles, in 53 minutes. There was a heavy rain all the way beyond Philadelphia. The train consisted of three cars, a combination baggage and dining car, the parlor car "Cecilia" and the observation car Olympic. The weight of the cars was 125 tons, and of the locomotive and tender 76½ tons. Engine 340 hauled the train on the New York division, and No. 101 on the Philadelphia, Wilmington & Baltimore.

Ship Building in British Columbia.

The Albion Works Co., of Victoria, B. C., have contracted with the Esquimalt & Nanamio Railroad Co. to deliver a new steamer with twin screw propellers for the Comoux route by July next. This boat will be the largest and most powerful built in British Columbia. The dimensions of the new steamer are: Length over all, 180 ft.; breadth of beam, 30 ft.; depth of hold, 12 ft.

Launching of the "New York."

The 8,150-ton armored cruiser "New York" was launched at the shipyard of William Cramp & Sons, Chester, Pa., on Wednesday, Dec. 2. About 2,500 invited guests were present and there were 25,000 spectators in all. The contract for this vessel was signed Aug. 28, 1890, and the keel was laid a month later.

Careless Trainmen in France.

Le Temps, a Paris newspaper, has interviewed a number of railroad officers concerning the causes of recent serious trainaccidents in Europe, and reports their views, which are printed, in part, below. It will be observed that these opinions are substantially the same as those held concerning employés on American railroads by some of our managers. "Even before the recent numerous accidents in France and Switzerland public attention had been aroused. The government of the republic had applied a stricter inspection of the roads of France, and, in consequence of its investigations, decreed shorter hours for employés, in particular for the engine drivers. Accidents, nevertheless, increased in numbers.

"The increased insecurity of traveling was almost unanimously ascribed to the effect of the socialist and strike movements. The agitators, so the directors declare, have and almost completely destroyed that *esprit du corps* pride and interest in their company and their duties, which formerly made servants vie with each other in zeal and diligence to jealously guard the honor of *their* road and maintain its superiority to all others. Now, however, they are taught to look upon the road management as a vast machine for grinding gold out of the labor of the poor, and are filled with a great idea of their own importance and of that of their imaginary rights. Engine-drivers and pointsmen, instead of attending to their business, are thinking about the speech they are to make at their next 'syndicate meeting,' or reading wild articles on the 'Sins of Capital.'

"The Eastern and Northern Railroad superintendents also throw the blame, in a great measure, upon the same source. It is impossible to deny, they say, that since the last strike movement, and the formation of a railroad men's syndicate, accidents have become more frequent. This may be mere coincidence, but such is the fact. The director of another company, on the occasion of an official investigation, sums up the matter in his report by stating: 'It is much to be regretted that people should arouse in our staff aspirations, many of which can never be realized, and that the men should hear so much of what are called their rights and nothing of their duties.' The officers of the syndicate of engine drivers admit that the drivers have often, especially of late, appeared to be rather unsettled, but they deny that this is due to the recent strike movement. The syndicate absolutely refused to take part in the strike. The real cause of the catastrophes of Charenton, Velars, St. Mande and Brunoy is the want of a sufficiently numerous and competent staff."

Indian Railroad Policy.

Sir John Gorst, speaking at Liverpool, said the most important question connected with the trade of India was the development of the railroad system in that country. At the present time they were opening 17,300 miles, of which 3,340 miles were owned by the guaranteed and other companies, 12,900 by the state and about 1,360 by the native states. During the last five years the open mileage had been increased by 33,300 miles, an average of 650 miles a year. The construction of railroads in India was going on with the utmost possible vigor. At the present time the companies had about 1,580 miles in hand, and the Great East Coast Railway would connect Madras with Calcutta and would open up countries which were liable to visitations of famine. Arrangements were also being made to construct a line to connect Assam with Bengal. The government was desirous of encouraging private enterprise by every legitimate means and land was given free, and at the same time their policy was to continue to spend as much money as financial opportunities would allow in the construction of railroads as well as on navigation works.—*Herapaths.*

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Within a month, including this issue, we have recorded orders for 25,100 freight cars placed in various car works. This is about one-fourth of a good average year's output for the private car shops. This important industry, therefore, has a very different aspect from what it showed a month ago, when most of the shops were very dull. We understand that the contract prices are still very low, but at least the shops will be paying wages and buying material. One of the strange business phenomena of this autumn has been the slowness of the railroads in ordering material, in the face of unprecedented volume of business, greatly increased earnings and a universal shortage of equipment. The reasons have no doubt been almost altogether in the money market, and these are pretty well known. There has been, and still is, one difficulty in getting credit for large contracts which a large part of the public looks on as "academic," but which is eminently practical. That is the uncertainty about silver. It has happened repeatedly within recent months that arrangements for the purchase of equipment have fallen through because payment in gold has been one of the conditions of the contract insisted upon. This difficulty still exists, but with big earnings and the certainty that they will continue for many months, it is less of a factor than it has been. Whether or not the orders for cars will continue brisk, and whether or not like orders for other material will now be placed must still remain matters of speculation. There is little sign of improvement yet, beyond these large orders for cars.

The Chicago eastbound roads have been for some time considering the formation of an agreement for a division of freight traffic and they have got so far as to bring the scheme before the Trunk Line executive committee, where it is being considered this week. The plan, as far as now appears, is to be applied only at Chicago, and the managers seem to have arrived at no agreement, as yet, as to how closely they will copy the Southwestern agreement, which leaves the percentages to be newly arbitrated, month by month, by the Commissioners. The comparative stability of rates on the Southwestern roads since the adoption of this last mentioned agreement is doubtless the precedent that is relied upon as a justification of the present action, but as the cessation of rate cutting west of Chicago has been partially due to other causes, and as the evidence of the success of the "blind pool" is still mostly of a negative nature, the action of the Eastern roads must be regarded as an experiment. The action of the Southwestern roads has merely shown that the Interstate Commerce Commission is not likely to arraign the roads as lawbreakers, simply because they divert a little freight. The fact that the Commission *has* arraigned some of them as lawbreakers for rate cutting may have been a much greater factor in maintaining tariffs, and the roads that have given up freight to a competitor may have been constrained much more by temporary pressure from Wall Street than by any love for that kind of justice which traffic arbitrators deal out. Nevertheless, the Eastern roads have a not uninviting field in which to apply an agreement, provided they can stretch it in a dozen different directions at once without tearing holes in it To work with even moderate freedom from friction it would seem that it ought to include other points than Chicago, for the worst disturbances from which Chicago has suffered lately have been those arising from the free use of other gateways between the West and the East, such as those on the Indiana, Illinois & Iowa Railroad; and as soon as one other point is added, there will be demands to include a dozen more.

"Recent Railroad Legislation and its Effects upon the Finances of the Country" is the title of an interesting address, delivered before the recent meeting of the Bankers' Association, by Prof. Arthur T. Hadley, and published in this number of the *Railroad Gazette*. Professor Hadley attributes the great fall in the prices of railroad stocks since the spring of 1887 chiefly to the Interstate Commerce Act and to state legislation, which has unduly restricted the conduct of railroad business. He shows that the stocks of four of the companies which have great systems west of Chicago were worth $60,000,000 less Nov. 4 than April 4, 1887; and there had been already a great recovery from the lowest prices on the first-named date, the rise in value of the shares of a single one of the companies named having amounted to more than $15,000,000 since last July. Professor Hadley tells the bankers that the most effective check to harmful railroad legislation is the cessation of railroad construction in the country or territory affected by such legislation, and admonishes them that they, who on the whole determine how investments shall be made, or at least how they shall not be made, have a public duty to perform in this case, and should discourage new railroad investments where a fair field is denied to the railroad industry.

The New York, Lake Erie & Western.

The results of the working of this company for the year ending with September last are the most favorable of any recent year; but considering the extent and great importance of the system worked, its profits —those which accrue to the proprietors—were still extremely small, amounting to only $617 per mile of road worked. Indeed, the history of this company is a striking illustration of the extent to which the enterprise, energy and skill of railroad managers, exercised primarily for the purpose of benefiting their employers, the holders of shares in their company, usually go very largely and often wholly to the benefit of the public. Twenty years ago the Erie was in fearful condition; its traffic had ceased to grow and it could not have handled it if it had grown; it had no credit, and deserved none. Since that time its proprietors have made great efforts to secure an income from their property. In spite of the company's bad credit they have succeeded in borrowing many millions of dollars and the line has been in many respects rebuilt, and its equipment has been renewed, greatly improved and enormously increased. Some of the ablest railroad men in the country have given their energies to it in various departments. Connections have been secured which give it access to the chief sources of traffic near its line and further west. Very great enterprise and invenuity have been exercised in attracting and developing such traffic, and great skill in reducing the cost of carrying it. And all this has been done with great success.

The connections are secured and they bring the traffic which was expected of them. The traffic has been developed in a marvelous way. The freight business last year was nearly three times as great as in 1872, and was 38 per cent. greater than in 1881, a year of extraordinary traffic. The passenger traffic was twice as great as in 1878. And the cost of doing the work has been very greatly reduced, an average train-load of 244 tons being hauled at a cost of $1.05 per mile, while in 1877 a train-load of only 145 tons cost $1.09 per mile. The passenger train, which has not changed much in load, costs 67 cents per mile against 84 cents, and the service has been greatly improved in quality. Earnings, it is true, have not increased in the same proportion, yet these were 6 per cent. greater in 1891 than in 1881, and 47 per cent. greater than in 1878. But with all this vast increase in the amount of work done, and the improvement in the quality of the work, and the great reduction in the cost of doing it, what has the *company* gained? The following statement will show. It gives the surplus of net earnings after paying fixed charges—the income available for distribution to the stockholders; though they have never got any of it except in the three years 1882, 1883 and 1884, and now again this year, the balance having gone toward improving their property.

Surplus over fixed charges, N.Y., L. E. & W. R. R., 1878 to 1891:

Year to Sept. 30.			Year to Sept. 30.		
1878	Surplus,	$625,432	1885	Deficit,	$1,376,944
1879	"	1,201,971	1886	Surplus,	14,611
1880	"	1,790,621	1887	"	601,799
1881	"	1,887,418	1888	"	738,843
1882	"	1,166,662	1889	"	774,776
1883	"	1,265,485	1890	"	830,254
1884	Deficit,	698,623	1891	"	1,005,378

When we remember that this company works 1,637 miles of railroad, a large part of which has a very heavy traffic, and which last year earned gross more than $30 000,000, the company's profits in the most favorable years seem very light; but the chief purpose for which they are cited is to show how far the company's successful efforts to increase and improve its traffic and lessen the cost of carrying it have benefited *itself*. We see that with 70 per cent. more freight and 90 per cent. more passenger traffic than in 1879, its profits have been less than then, and less than in any of the four years following. It is only when we begin with the last crisis in the affairs of the company in 1884 and 1885, that progress in this particular is at all satisfactory. We may say that the great improvements made on this line have pretty much all gone for the benefit of the public, and the owners of the railroad, as the fruit of all their efforts, have barely succeeded in keeping their property from going into the hands of their creditors. In the last 15 years they have received in dividends less than $2,000,000, the earnings meanwhile having been about $300,000,000! It is true that but for great growth and improvement, the stockholders would have lost all their property, and the moral seems to be that the danger of losing our property prompts us to our utmost efforts quite as much as the prospect of making a great income from it.

The greater part of the Erie's recent increase in earnings is due to the coal traffic. The earnings from other freight were larger than last year in 1880, 1881 and 1890; but the coal earnings were more than twice as great in 1891 as in 1880, and more than three times as great as in 1878. In the last-named year coal earnings were but 18 per cent. of the total freight earnings; in 1891 they were 38 per cent. The passenger earnings were not quite as great as in 1882, though the passenger traffic was one-fourth larger.

The gross earnings of the Erie and its leased lines (including the N. Y., P. & O.) were 3½ per cent. larger in 1891 than in 1890, and the net earnings 4½ per cent. greater. A little more than half of the increase in net earnings was absorbed by an increase in the fixed charges, leaving a gain of $145,124 in the surplus, bringing it up to a little more than a million. The payment of a dividend of 6 per cent. on the preferred stock requires a little more than half a million, and we see that in only three of the last 14 years has the surplus fallen below that amount. Yet in only three of those years has the dividend been paid, which added to the one declared from the profits of last year (3 per cent.), makes a little less than $1,800,000, out of very nearly $10,000,000 aggregate net surplus. That is, the owners of the railroad have found it necessary to put about five-sixths of their net profits into improvements of their property.

Tail Lights and Collisions.

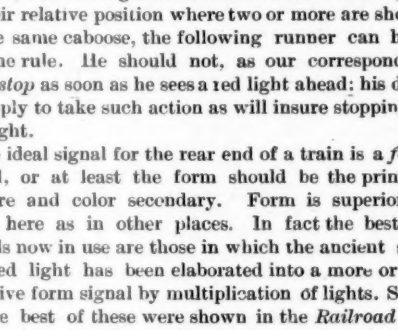
The use of green lights, instead of red, for signals at the rear end of trains at night is advocated by a correspondent in another column. He presents some good points, and it would often promote safety for a tail-end man to change lights so as to indicate whether the train were moving or standing still, but by the proposed plan the inconsistency complained of would only be supplanted by another, and not cured. The changing of lights to indicate whether or how fast a train is moving is now and has been for several years practiced on the Pennsylvania, though this is in addition to the usual tail-lights, a single hand-light, with different glasses on different sides, being used.

The fact is that we try to do so much with two colors, red and green, that we are constantly sacrificing consistency for simplicity or convenience. The attempt to show red only to the engineman whom it is desired to stop and to show it to him only at the *time* it is desired that he shall stop is never wholly successful. A red tail light tells you to stop—where? *At* the light, of course. But it is impossible to limit or define the field which its rays shall penetrate, and there

can therefore be no accuracy in any use of it for a caution signal—for telling the engineman where to shut off steam or apply brakes. But a caution (green) signal at the rear of a train would be faulty because it would not tell a runner to positively stop before smashing the caboose. If he stopped before running into the train it would be because he had received some other intimation than that conveyed by the mere color of the light. It is true that red is more appropriate as a tail signal when a train is standing or is moving very slowly, than when it is moving at its regular speed, but consistency demands that it be displayed at all times. It cannot be assumed that a train will never be run into at the rear except when it is slacking or starting or standing still. A fast special overtaking a slow freight running at its usual speed must be provided against. Most superintendents would also object to a plan in which the failure of the brakeman to promptly change the light might lead to a collision.

The real reason that enginemen fail to stop at red lights which they can clearly see is their habit of running risks. When they see a red light which they cannot positively locate, their only safe course is to shut off and apply brakes at once, but this they do not do. Practically, a runner following another train and having no caution signal to tell him how far ahead that train is, must estimate the distance by the size of the red light, or the distance apart of two caboose lights, or by some other means than the mere redness of the light. There is, indeed, a need of better tail signals, but as long as dependence is placed upon mere redness, without regard to the number or size of lights or their relative position where two or more are shown on the same caboose, the following runner can have but one rule. He should not, as our correspondent says, *stop* as soon as he sees a red light ahead; his duty is simply to take such action as will insure stopping *at* the light.

The ideal signal for the rear end of a train is a *form* signal, or at least the form should be the primary feature and color secondary. Form is superior to color here as in other places. In fact the best tail signals now in use are those in which the ancient simple red light has been elaborated into a more or less effective form signal by multiplication of lights. Some of the best of these were shown in the *Railroad Gazette* of June 29, 1888, and the general idea is indicated by the accompanying sketches, of which Fig. 1 shows an arrangement of lights suitable for a freight caboose and Fig. 2 one for a passenger car.



It will be understood that these are only suggestions. The usual arrangement of three or four lights is very satisfactory, and we show the larger number merely as a reminder how easy it is to make a very effective form signal. By using two or more colors any reasonable demand for a variety of indications can be met. The need of a variety on a four-track road, and on many others, was shown in the article just referred to.

Although the knack or art of estimating the distance to a pair of lights on a caboose is not susceptible of accurate statement in few words, it is for all practical purposes so easy that any fireman can quickly acquire it, and the old rule that was in force 25 or 30 years ago on some roads that "no excuse will be received as to being deceived about the distance" is certainly a reasonable one now if it was not so in every case then. A device was invented and tried several years ago for focusing two red lights at a single point, lenses being placed in the cab window in such a position that on approaching, say, within half a mile of two caboose lights placed four feet apart they would be blended into one image upon the engineman's eye; but there is no practical value in the idea.

In speaking of colored lights in general our correspondent opens up a wide subject. Switch lights on some roads show red for the side track because green is used for the main track. This green light practically means all clear, for as soon as the runner of a fast train sees it he knows that he need *not* slacken; and the claim that it is a caution signal cannot be supported. This use of green is not diminishing, so far as we can see, and in fact it has in its favor the argument that where white is used for all clear a runner who has been careless can often fix up a plausible defense by claiming to have been deceived by a street light. A red light is often used inconsistently by a rear brakeman, for he exhibits it at a point far enough back to admit of the flagged train being brought under control after passing the light and before running into danger; and a green light would be more consistent in his hands than red. Red is generally made consistent in cases like this, however, by stopping the train to take up the flagman; but every time that an engineman runs past such a signal, either because he could not see it in season or from loose general practice, the efficiency of red as a positive stop signal is impaired. The most systematic and precise use of lights that we have is in connection with semaphore signals. Here a red light means stop *at* the light and a green light means use caution *at* the light. There are inevitable complications in attempting to compel men to obey a signal before they get to it, and the most practical line in which uniformity and consistency can be attempted is doubtless in the direction of making all other signal lights conform to the principles used in semaphores. When some one has discovered and used the third color that we are waiting for, a scientific and thorough application of these principles will be easy.

October Accidents.

Our record of train accidents in October, given in this number, includes 120 collisions, 91 derailments and 13 other accidents, a total of 224 accidents, in which 58 persons were killed and 179 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	Butting.	Crossing and other.	Tot'l.
Trains breaking in two	14	..	..	14
Misplaced switch	4	4	2	10
Failure to give or observe signal	8	3	4	15
Mistake in giving or understanding orders	..	11	..	11
Miscellaneous	5	2	8	15
Unexplained	32	12	11	55
Total	63	32	25	120

DERAILMENTS:			
Broken rail	9	Careless running	1
Loose or spread rail	4	Runaway train	1
Broken bridge	4	Open draw	1
Defective switch	3	Trackmen	2
Defective frog	1	Animals on track	2
Broken wheel	3	Landslide	1
Broken axle	7	Accidental obstruction	2
Broken truck	2	Malicious obstruction	1
Fallen brakebeam	1	Man on track	2
Broken coupling or drawbar	2	Unexplained	36
Misplaced switch	6		— 91

OTHER ACCIDENTS:	
Boiler explosion	2
Cars burned while running	4
Various breakages of rolling stock	1
Other causes	6
	— 13
Total number of accidents	224

A general classification shows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.	P.c.
Defects of road	..	21	..	21	10
Defects of equipment	14	15	3	32	14
Negligence in operating	51	11	5	65	29
Unforeseen obstructions	..	8	5	14	06
Unexplained	55	36	..	91	41
Total	120	91	13	224	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.
Passenger	37	25	5	67
Freight and other	186	69	8	263
Total	223	91	13	330

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
KILLED:				
Employés	23	13	6	42
Passengers	6	7	..	13
Others	3	..	..	3
Total	32	20	6	58
INJURED:				
Employés	65	33	2	100
Passengers	18	56	..	74
Others	1	4	..	5
Total	84	93	2	179

The casualties to passengers and employés, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	..	20	3	5
Defects of equipment	..	3	7	3
Negligence in operating	11	40	27	69
Unforeseen obstructions and maliciousness	..	3	..	4
Unexplained	2	8	5	17
Total	13	74	42	98

Twenty-nine accidents caused the death of one or more persons each, and 48 caused injury but not death, leaving 147 (66 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with October of the previous four years shows:

	1891.	1890.	1889.	1888.	1887.
Collisions	120	152	112	82	64
Derailments	91	115	70	58	49
Other accidents	13	16	8	6	4
Total "	224	283	190	146	117
Employés killed	42	71	43	45	20
Others "	16	17	8	75	14
Employés injured	100	204	133	120	50
Others "	79	176	91	103	59
Passenger trains involved	67	97	73	54	38
Average per day:					
Accidents	7.23	9.33	6.13	4.71	3.77
Killed	1.87	2.84	1.65	3.87	1.10
Injured	5.77	12.26	7.23	7.19	3.52
Average per accident:					
Killed	0.259	0.311	0.268	0.821	0.291
Injured	0.799	1.343	1.179	1.527	0.931

Of the 13 passengers killed in October, only three were in the cars of a passenger train. Two of these are charged to the derailment at Hicksville, O., on the 14th. This derailment is classed by us as unexplained. The Ohio State Inspector made more or less investigation, and reports that "some hard substance got between the rail and the flange of one of the driving wheels," thus derailing the engine, but we have seen no details of the evidence going to support this theory. The six passengers killed at Thorson, Minn., on the 26th, were in a caboose at the rear of a freight train, and their lives were sacrificed by the negligence of the men on the freight train that ran into the caboose; and this negligence seems from all accounts to have been of the grossest kind. It is true that collisions of this sort happen every week, and that intelligent railroad officers know how they ought to go to work to prevent them; but as long as proper preventive means are not adopted—as long, in fact, as we are compelled to admit the force of the old theory that trainmen will not be as careful when following freight as when following passenger trains, the simple moral seems to be, as it has been in the past, Don't carry passengers on freight trains.

The three reporters of the Chicago *Inter-Ocean* killed at Crete, Ill., on the 15th, have been classed as passengers. The freight trainmen who left the switch wrong have been censured by a jury, and we understand the company throws the blame wholly upon them. The engineer who ran over the misplaced switch in broad daylight was killed, so that the degree of his negligence cannot be fully discussed, but we have seen nothing in the accounts to show that there was not a full view of the switch for some distance before reaching it. This disaster naturally caused a good deal of discussion in Western newspapers, technical and other, and there was another disaster at a misplaced switch on the Chicago, Burlington & Quincy five days later; but none of the editorials that we have seen have placed the emphasis on the right point, which is that there is a crying need for interlocked distant signals at switches on single track roads where trains are run at high speed.

The collision at Mingo Junction, O., on the 16th, did not result in the death of any passengers, but it was a very disastrous one, and the fire which broke out did great havoc. The express company's safes were taken to the Treasury Department at Washington, and the value of several hundred thousand dollars' worth of bank notes and bonds was dependent upon the extent to which they could be identified after having been through the fire. The derailment at Sir John's Run, W. Va., on the 21st is said to have been caused by the breaking of a driving wheel, but we have no positive information on the point. The bridge which failed at Florence, Ala., on the 18th, is said to have been a rickety one. The blame for the crossing collision at Taopi, Minn., on the 20th, is laid by a coroner's jury on the Chicago, St. Paul & Kansas City.

A point to be remembered by officers who have at great cost erected elaborate fixed signals, and who depend upon them for safety, is found in the report of the butting collision at Mont Clare, Pa., on the 22d, in which, as in the derailment at Boston, Sept. 22, the safeguards afforded by well-arranged semaphores were unavailable on account of temporary failure of parts of the appliances. The duty of making repairs with the utmost promptness and that of training signalmen to adopt extra safeguards during temporary suspension of the ordinary regulations are not the least important rules of signal management.

Another lesson to be learned from this month's record, often given in previous records, but emphasized by the unusual number of flagrant instances this month, is that to be found in the butting collisions caused by conductors and enginemen forgetting their meeting points. While the cure of this sort of negligence demands action in several different lines, which need not be rehearsed to those who read these records, there is one point in particular that seems to be neglected in a most unaccountable manner, and that is the *joint responsibility* of conductors and enginemen. Is it a normal result of the law of chances that two intelligent men should make the same fatal mistake as often as we nowadays read of? But whether it is or is not impossible to prevent these blunders, it is wellnigh certain that the cases heard of indicate the existence of many more cases not heard of, and there would seem to be a plain duty resting upon somebody to detect these latter. Some superintendents do their best to perform this duty. Those who do not follow this example cannot claim, as in arguing against the block system, either that there are objectionable principles involved or unwarrantable expenditures demanded.

Fires in cotton warehouses at various points on Southern roads were unsually numerous in the press reports of October. At Birds Point, Mo., on the 23d, a fire which started in cotton on the platform destroyed 74 carloads of cotton and other merchandise. The total losses from cotton fires of which we have noticed reports, aggregate about $200,000. On the Alabama & Vicksburg, on the 30th, a long passenger train ran over a rail from which 3½ ft. had been broken out, but no serious damage was done. Near Salt Lake City, on the 15th, the discovery of a lot of broken spikes and bolts showed that a car in a passenger train had run about a mile on the sleepers and had rerailed itself at a switch; but of several trains which had been over the road it could not be decided which one had been off the track. Evidently some of

the passenger cars were empty. On the Northern Pacific & Manitoba, on the 17th, several cars of a freight train were derailed by wheat which ran upon the track from a car whose end burst open. At Memphis, Tenn., two freight cars ran off a transfer steamer and four tramps in them were drowned.

In the tunnel of the Baltimore & Potomac, at Baltimore, on the 7th, a train running north on the southbound track struck a gang of 10 trackmen, killing two and badly injuring four of them. At Tomales, Cal., on the 6th, three bridge carpenters, in a hand car, were killed by a freight train. At South Park, Minn., on the 14th, 11 men were injured, two fatally, by the explosion of a locomotive boiler at the shops of the Chicago, St Paul & Kansas City.

Three persons were severely injured at Flushing, L. I., on the 12th, by the stoppage of an electric street car on a crossing, where it was struck by a freight train. The accident happened in daylight, but it appears that the freight train had broken in two and the gateman allowed the street car to cross immediately after the passage of the forward part of the freight. On the night of the 25th there was a serious collision, caused by a misplaced switch, on a "dummy" line near Nashville, Tenn., several persons being injured. Fatal accidents at grade crossings were numerous in October, and three at least killed two or more persons each. These were at Bergenfields, N. J.; Camden, N. J., and Giffords, Staten Island.

It has already been announced that the stockholders of the Louisville, New Albany & Chicago have authorized the issue of $5,000,000 additional stock, making the total capital $12,000,000. The directors now offer $3,200,000 of this to stockholders at 25. It is proposed to devote the proceeds to improvement of the road and equipment. The Indianapolis Division will be laid with heavier steel, and the steel taken up there will be relaid on the Michigan Division, where the rails are now iron. Increased yard accommodations at Chicago will be provided, and also passing sidings and yard tracks elsewhere. A narrow gauge feeder into valuable stone quarries will be made standard, portions of the line will be ballasted, wooden bridges will be rebuilt in steel or iron, and freight and passenger cars will be purchased. It is estimated that these improvements will permit an increase of $250,000 in net earnings in the year 1893. At first sight it seems as if an additional net income of $250,000 from the expenditure of $800,000 was a pretty sanguine estimate, but this has probably been put forth as a conservative estimate, and in good faith. In fact it is not at all an impossible result. This increase is but 25 per cent. of the net earnings in the year ending Dec. 31, 1890; and such an increase is not very remarkable. It is mostly a question of the traffic to be got and the capacity to handle it. The traffic is there no doubt, and can be got if it can be handled. The road has an excellent entrance to Chicago, controlling one-fifth interest in the Chicago & Western Indiana. It has good lines to Louisville and Indianapolis; and from Indianapolis reaches Cincinnati by the C. H. & D., and it passes through rich counties. There should be no difficulty in getting plenty of business at paying rates. In fact the freight rates in 1890 were the highest it got in six years, except in 1889; and the passenger rates were the highest without exception. Now it is quite conceivable that a judicious expenditure of $800,000 may make a very great difference in the amount of traffic that can be passed over the road. Strengthening one bridge may greatly increase the length of trains hauled on one engine division; and a very small expenditure on yard tracks and passing sidings may greatly accelerate the car movement. Every practical railroad man of much experience has seen these things done over and over again. We have said what *may* be the case. What it will be we do not pretend to predict; but that the "Monon" will soon have this money to spend in improvements we think there is little doubt.

The place for holding the "Waterways Convention" has been changed from Washington to Detroit, and it will be held in that city on the 17th inst. The convention will probably be unanimous in demanding large appropriations for a speedy completion of the improvement of the navigation of the lakes in conformity to General Poe's plan for a 21-ft. waterway from Duluth and Chicago to Buffalo. This is expected to cost nearly three and a half million dollars in addition to the cost of the new lock at the Soo and the Hay Lake channel, which are already provided for. There will also be substantial unanimity in expressing the desire for more convenient and deeper harbors along the lakes. But Buffalo, it is understood, will object strongly to any effort to connect the lakes with tidewater by a canal 21 ft. deep. There are three schemes for accomplishing this result: Corthell's ship railroad between Georgian Bay and Lake Ontario, with the enlargement of the St. Lawrence canals; a plan to build a ship canal around Niagara Falls on the American side and from Oswego to Albany, with the deepening of the upper part of the Hudson; and Sweet's project for a radical enlargement of the Erie canal, which also implies a deepening of the Hudson. Mr. Corthell's plan will probably not be favored to any extent, as it cuts Lake Erie and the towns on its shores out of the channels of commerce, and will make the productions and commerce of Lakes Superior, Michigan and Huron tributary to Montreal. The Niagara Falls ship canal is feasible and desirable, but the route from Oswego to the Hudson will be very expensive and it is doubtful if sufficient water can be obtained for navigation. If this can not be accomplished the improvement, aside from the magnificent water-power it will furnish, will be of more value to Montreal than to the United States. The radical enlargement of the Erie canal presents no obstacle except its expense, probably $150,000,000. Lake Erie, which has a mean discharge of about 265,000 cu. ft. per second, is 573 ft. above tidewater. This will allow a canal to be built with a continuous fall from Buffalo to Albany without very heavy work at any point and it will be observed that there is water enough for navigation.

The season of lake and canal transportation has virtually ended, although about 100 vessels are still outside of harbors, not counting the 90 vessels detained at Buffalo through lack of berths for unloading. The Buffalo *Courier* publishes a comparative statement of the lake and canal trade of Buffalo up to and including Nov. 30. The following table shows the aggregate receipts of flour and grain at Buffalo from the opening of navigation to Dec. 1 for the years mentioned:

	Flour, brls.	Grain, bu.	Grain, inc. flour, bu.
1891	6,083,930	123,397,390	156,817,040
1890	5,905,840	87,010,090	116,539,290
1889	5,065,620	88,630,710	113,958,810
1888	5,050,150	72,178,050	97,428,800
1887	3,858,860	83,547,280	102,841,580
1886	4,425,270	71,587,760	93,714,110
1885	2,740,570	49,174,240	62,877,090
1884	2,529,510	55,566,530	68,234,080
1883	2,050,290	64,156,370	74,397,820
1882	1,942,840	49,959,320	59,674,020
1881	1,015,467	56,652,188	61,879,506
1880	1,278,626	104,675,449	111,068,579
1879	884,631	72,753,446	77,076,601
1878	920,021	76,744,714	81,389,819
1877	657,723	62,577,317	65,865,932

The shipments by canal for the period of navigation have been as below:

From the opening of navigation to Dec. 1:

	1891.	1890.	1889.	1888.
Canal opened	May 5.	April 28.	May 1.	May 16.
Flour, bbls	9,822	1,805	8,450	4,950
Wheat, bush	24,455,660	11,074,360	15,318,260	15,657,500
Corn, bush	4,694,440	21,372,670	20,607,300	17,646,780
Oats, bush	925,200	2,728,090	3,823,460	3,947,660
Barley, bush	1,824,130	2,440,100	632,500	66,920
Rye, bush	2,368,620	603,740	1,220,300	392,750
Total, bush	34,267,990	38,218,960	41,741,980	37,710,910

Also, 95,180 bush. barley malt in 1891, 244,250 bush. in 1890, 213,050 bush. in 1889, 35,410 bush. in 1888.

The shipments by lake from Buffalo from the opening of navigation to December 1 were:

	1891.	1890.	1889.	1888.
Coal, tons	2,396,380	2,146,910	2,156,670	2,548,620
Cement, plaster, brls	562,720	615,720	495,400	370,790
Railroad iron, tons	9,055	31,287	6,981	13,914
Salt, brls	150,730	150,820	172,960	143,460
Salt, tons	1,913	2,639	1,082	4,115

The closing freights were: For coal $1.00 to 0.75; wheat and corn from Chicago, 4½c; wheat and corn by canal to New York, 4⅛c. The steamer "E. C. Pope" cleared the last of the month with 3,500 tons of coal for Duluth at 75c., and the round trip will probably pay about $8,000. A low-powered boat could not undertake this trip, and the "Pope" may spend the winter at the Sault Ste. Marie.

The six boats of the Minnesota Steamship Co. have made during the season 135 trips, carrying iron ore between Two Harbors and Cleveland, 889 miles, besides one trip in the grain trade between Duluth and Buffalo. The ore brought down was 290,944 tons, so that the ore transportation amounted to over 250 million ton-miles. If to this we add the probable ton mileage of the wheat cargo to Buffalo the aggregate ton mileage will be 260,725,386—a tidy little traffic which might satisfy some railroads in this country for a year. There are now 15 large steamers under construction or contract in lake yards, to be ready for business either at or near the opening of next season, and two of them are designed to have a carrying capacity of 3,400 gross tons, as against the average cargo of 2,155 tons carried by the Minnesota boats, and all of them are classed as "big boats." Under these circumstances the owners of the boats which commenced work this season with ore freights from Escanaba at 55 cents, fear that the new boats will "overdo things and lose money." Some even predict rate quarrels and demoralization. But the profits of lake freighting, notwithstanding the low rates for a portion of this season, have been too large to allow fears of even a rate war to stop further building. If the lake owners did not expect a large and profitable business for next year they would, undoubtedly, have sent their boats down the St. Lawrence to interfere with the profits of the tramp grain carriers on the Atlantic.

The extent and acceptability of the practice which we call "pooling" on the continent of Europe may be judged from the fact that an Austrian railroad man has published a book of 144 pages devoted to the discussion of the ways of forming and carrying out agreements for the division of traffic on the earnings from it. (Rauk: Grundsätze für den Abschluss von Eisenbahn-Tarifcartellen.) If we go to this treatise, however, for arguments concerning the propriety and usefulness for such agreements, we shall be disappointed. The author says that he takes it that the question of the desirability of such traffic agreements has been settled affirmatively, theoretically and practically, in the interest of the public as well as the railroads. His account of the European practice, in which, frequently, railroads of several countries are involved, indicates that it is variable and often quite complicated. Commonly, apparently, a very few of the more favorable routes are left to carry the whole pooled traffic, while the indirect routes receive a share of the net earnings. Under many of these agreements the work of making the rates is something tremendous. Under one agreement there would be 4,500,000 different rates and two months are required to get the rates ready after a change has been determined upon. Rauk's book is largely devoted to the advocacy of plans for simplifying the methods and reducing the work of auditing and accounting.

Considerable circulation has been given to a story that the German Government has placed an order in this country for from 80 to 100 tons of aluminum, to be used for military purposes. It appears to be the fact that the Pittsburgh Reduction Company has received an order from a private firm in Germany, and not from the government, for 10 tons of aluminum. As to the purposes to which this is to be applied we can get no authentic information, but it is a pretty safe guess that it is to be used for military purposes of various sorts, as it is a fact that the German Government for a good while has seriously been considering such uses of aluminum. It is true also that there is, or has been, an order on the market for between 80 and 100 tons of aluminum to go to Germany. It is not only credible, but highly probable, that the consumption of aluminum for military accoutrements will be very great within a few years. It is increasingly important to lighten the soldier's load. With the introduction of magazine rifles it becomes a very serious question how to distribute ammunition to the fighting line, where it will be consumed much faster than with the simple breech loader; and everything that enables the soldier to carry an additional round on his person is so much gained.

A meeting was called for Dec. 1, in Chicago, of Presidents and Vice-Presidents of Western roads, to devise methods for reducing the number of free passes issued for passenger transportation. The meeting was held but the attendance was small. Only 15 roads were represented and it was decided that no definite action should be taken. A committee was appointed to consider the matter further and if thought advisable call another meeting. We have no knowledge of the discussion which took place, but the small attendance and the vague action suggest a good deal of apathy, which certainly is unfortunate. A good deal of that youthful enthusiasm in this matter which led folks to believe that the system of giving free passes would be done away with within the nineteenth century has passed away, but still one must watch with interest every hopeful sign. This practice, like paying ticket commissions and selling tickets through scalpers, and other barbaric and wasteful procedures, has its roots in an abiding distrust of each other among the railroads.

Few understand, probably, how far the recent progress of the Erie is due to the growth of its coal traffic. No longer ago than 1878 this traffic was but 22 per cent. of the total freight traffic, and yielded but 18 per cent. of the total freight earnings. Last year, while other freight had increased 56 per cent., coal traffic had increased 366 per cent. and was 45 per cent. of all the freight, and produced 38 per cent. of the total freight earnings, and this was not the Erie's best coal year. That was in 1888, when the coal traffic was greater than all the other freight traffic and yielded 45 per cent. of the freight earnings. The *amount* of the coal traffic was largest last year, but the earnings from it were less than in 1888. The number of tons of coal handled has long been immensely greater than that of other freight, but all our calculations are for ton-miles. The average haul of coal is but 116 miles on this road, while the average of other freight is 211 miles. Since 1880 the general freight earnings have *decreased* $210,000 (2 per cent.), the passenger earnings have increased $656,000 (18 per cent.), and the coal earnings $3,551,000 (11 per cent.) The Erie is now one of the greatest coal carriers in the world.

South Dakota reports that its grain blockade is raised, "temporarily at least," which would seem to indicate that the complaints of scarcity of cars had been too vociferous, or else that the car crop ripens faster in that stimulating climate than elsewhere. A "famine" that lasts only a week is not very lusty. In North Dakota the farmers are exercised because the Great Northern Railway has notified agents "not to furnish cars for shipment of wheat to any but elevators and actual farmers." The farmers complain that the exclusion of the speculator, who engages a car expecting to buy by the wagon load to fill it up, shuts them out also, thus giving the elevators the best chance under any and all circumstances. The trouble seems to be that the road, if it desires to get the grain to market quickly, must necessarily—and justly—discriminate against all classes who load slowly; that is, all except elevators. The phraseology of the circular seems to have been intended as a sugar coating for a bitter pill; but it didn't go down.

Chief Engineer Worthen, of the New York Rapid Transit Commission, has been "promoted" to the rank

of Consulting Engineer. It is the general belief that Mr. John Bogart will succeed him. Of course it is pure speculation to say what the change means, but there is naturally a good deal of uneasiness about it and public opinion is very strong that it is a step toward an end which Tammany and other politicians have very definitely in view.

It appears to have been Heaven's mercy or luck, and not good management, that saved the New York Central & Hudson River from a terrific accident at Tarrytown on the evening of Dec. 1. A fast express train which does not stop at that point ran into the rear of a local passenger train standing before the station. It would be a waste of words to say anything at all about block signals or station signals or any other device for the protection of trains on a road aspiring to run Empire State expresses on a mile-a-minute schedule. The facts are enough.

NEW PUBLICATIONS.

Transactions of the American Society of Civil Engineers, September, 1891.

This number of the *Transactions* contains five papers presented or discussed at the Summer Convention of the Society, with discussions on them. One of these is the Marent Gulch Viaduct, which was presented by Mr. George S. Morison, the engineer of the structure. The paper is a very short one, but it is copiously illustrated, with a view of the completed viaduct and many plates of details. The total length is 736 ft. 8 in.; the total height from the top of masonry to the top of stringer 201 ft. 9 in. It is on a grade of almost two per cent.

Mr. Julien Hall's paper on Right of Way for Railroads with the very full discussion had at the Summer Convention, and previously, also appears. There are two papers on Cements, Mortar and Concretes.

Lumberman's Hand Book, by W. B. Judson. Chicago: Published by the *Northwestern Lumberman*. Price, $1.25.

This handy pocketbook is already familiar to most of our readers who are interested in buying, selling or handling lumber. It has been issued regularly since 1879, and the present volume is the latest revision, dated 1891. It contains the rules for inspection and grading of all kinds of lumber at all the principal lumber centres, the laws of the various states touching upon liens, inspection, etc. There is also considerable data concerning the rules of the trade and the customs of lumber merchants in various foreign countries.

Journal of the Association of Engineering Societies. October, 1891. John W. Weston, Secretary. Chicago.

This issue of the *Journal* contains an article on Tests of Compound Locomotives, by C. H. Hudson, General Manager of the East Tennessee, Virginia & Georgia, there being in it considerably more material than was given in the chapter in the annual report of the road, which was published in the *Railroad Gazette* of Nov. 13. Other articles are: Notes on Railroads and Railroad Tunnels in Wisconsin, by Mr. Woodman, of St. Paul, and a valuable paper on the Selection of Sources of Water Supply, by F. P. Stearns, of Boston.

TECHNICAL.

Manufacturing and Business.

The Nowlin Safety Switch & Signal Co., of Chicago, has been chartered to manufacture railroad appliances. C. E. Nowlin, Charles Kirchner and W. G. Barne are the directors.

The Ajax Forge Co., of Chicago, is building an addition so as to increase the output of its switch crossing department by one-half. It will be of brick and the dimensions are 100 × 125 ft.

The 25 Cincinnati, Hamilton & Dayton cars building at the Barney & Smith Mfg. Co.'s shops at Dayton, O., are to be fitted with the Wheeler car seat.

The statement in this column last week that the new hydraulic jack brought out by Watson & Stillman, of New York, was the largest size jack made by that firm was an obvious error. It is a new size of base jack and is built with a specially broad base, being designed for heavy passenger car work. The capacity of the jack is 30 tons and Watson & Stillman make several jacks of this style, one of greater capacity, but shorter.

The Gold storage car heating system and coupler is being put on 10 new suburban cars of the New York, New Haven & Hartford. Twenty cars on this service are already equipped with the Gold system, and have been running all this fall.

The recent loss by the nut and bolt works fire at St. John, N. B., is now stated at $35,000; insurance, $20,000. The plant is not wholly destroyed, but it will cost a good deal to replace it, and the directors have not decided whether the works should be rebuilt.

The Sebastian May Co. of Sidney, O., has reorganized by electing Jacob May President and General Manager, and A. C. Wagner Secretary and Treasurer. The company manufactures light lathes and machinery. The plant covers several acres and includes a machine shop 170 × 62 ft., and an engine room 40 ft. square, directly in the rear. It is heated by steam and lighted by electricity. The front of the building is two stories high, the upper portion being occupied by offices. Among the tools in the machine shop are three G. A. Gray heavy planers.

The Chicago, Burlington & Quincy has ordered 120 Acme car lamps from the Adams & Westlake Co., of Chicago, for use in the 30 cars now building at the St. Charles Car Works. The same style of lamps have also been ordered for the 20 chair cars building at Pullman.

The Marden Frog & Crossing Works, of Chicago, are adding to their plant a brick addition 72 × 140 ft. Additional heavy planers, drills, rail bender and new furnaces will be put in, and the capacity increased by one-third.

The Universal Brakebeam Co., of Chicago, has just completed arrangements for turning out the brakebeam in large quantities. During the month of November the company received the following orders, all of which can be shipped without delay; a recent patent decision of the Western Railway Association removes one of the difficulties under which they have been placed: 2,400 for Cincinnati, New Orleans & Texas Pacific; 1,200 for Hicks' Stock Car; 2,400 for Burton Stock Car Co.; 200 beams for Illinois Central; 1,000 for Jacksonville Southeastern Line, and 500 for the Erie Railroad.

The National Lock Washer Co., Newark, N. J., has some very large orders on hand. The use of the washer for track work has greatly increased the past year, and many large roads are using it for car and locomotive work, where it is giving excellent satisfaction. It is also much used for agricultural implements, carriages and bridges, in fact, in all places where there is pressure on the nut and a locking device is required. The washer is made in a large variety of sizes by special machinery designed by the president of the company. The process, from the time the strips of steel are rolled on the mandrel to the time they are finished ready for use, being a very interesting one.

The new plant of the Milwaukee Car Wheel & Foundry Co. in St. Paul, Minn., is to be ready for occupancy on Jan. 1. The site is seven acres in extent, being the easterly portion of the old St. Paul Harvester Works, which are situated between the tracks of the St. Paul & Duluth and the Chicago, St. Paul, Minneapolis & Omaha roads, in East St. Paul. Several of the old buildings will be remodeled and utilized, and a new foundry is now under construction. It will be a frame building with an inner wall or lining of terra cotta, and will be 75 × 200 ft. in size. It is reported that the number of wheel pits to be put in will be 64 and that the manufacture of malleable and other castings will be an important part of the company's business.

Iron and Steel.

The Muskegon Iron & Steel Co. has completed its buildings and furnaces at Muskegon, Mich., for making steel by the Adams process. There are two furnaces, with a combined capacity of 1,000 tons of steel a week.

At a recent meeting of the creditors and owners of the Blandon Co. at Reading, Pa., a proposition was offered for the reorganization of the company by the creditors, but no definite action was taken. The secured and unsecured indebtedness is said to amount to $64,000.

The Rail Market.

Steel Rails.—The market continues quiet, with nothing important to mark it. Rails continue to be steady at $30 at Eastern and Pittsburgh mills, and at $31 at Chicago.

Old Rails.—Both the eastern and western markets are weak, and few sales are reported. The quotations are about $21.75 at Chicago, and $23@$23.50 at Pittsburgh, for old iron rails. Old steel rails sell for $18@$19 at New York, $18 at Pittsburgh and $13.50 at Chicago.

Irregular Wear of Driving-Wheel Tires.

An interesting contribution to the subject of the wear of locomotive tires has been made in a circular just issued by the Midvale Steel Co., of Philadelphia, giving conclusions drawn from investigations into the causes of so-called "soft spots." The results, as stated, are confirmatory of previous conclusions on the much discussed point regarding the uneven wearing of the different tires of an engine and of different points on each tire, due to the eccentric action of the counterbalance.

This company has found that the flattening of the tires was due to some cause other than a variation in the hardness of the metal, and early discovered:

First, That the alleged "soft spot" almost invariably developed in the main drivers.

Second, That while sometimes both the right and left main drivers would flatten, in almost every case it was the left-hand; and

Third, That these flat spots were invariably found at or near the same spot with reference to crank pin and counterbalance.

"In the course of the investigations it was found that in one instance nine locomotives, all of the same weight, build and design, running on the same road, in similar service and with all the conditions as nearly identical as possible, all flattened their main driving tires at precisely the same spot on the wheel, and the flattening was more pronounced in the left main driver than in the right. On another road were found four engines of same build, etc., all of which had flattened the main drivers on the same point on each relatively to pin and counterbalance, and all flattened to a greater extent on the left side than the right. Many similar instances were found, and, with scarcely an exception, the left main drivers have been the only ones which have flattened, or the left main had flattened to a greater degree than the right. More complaints of this character came from the railroads running through the sandy soil of Florida than from any other section of the country. On the other hand, the complaints from stone-ballasted roads, like the Pennsylvania and the Philadelphia & Reading, have been few or none. From all the evidence obtainable, it seems very clear that the engine itself is largely responsible for the flattening of the tires, and that in very rare instances it is due to inequality in the metal. To assume otherwise, we must believe it possible that all tires of metal unequal in hardness are invariably placed on the main drivers with the soft spots always in the same position in relation to the crank pins and counterbalances, and the tires with the very softest spots of all on the left-hand side of the locomotive."

The circular refers to Mr. Barr's paper on Irregular Wear of Locomotive Ties, read before the Western Railway Club last winter (*Railroad Gazette*, Feb. 6, 1891), in which it was shown that the tires of several locomotives with serious flat places had been slipped around on the centre, then trued up and again placed in service, and that the flat places in every case formed again at the same place relative to the centre but in a different place in the tire. The investigations of Mr. W. H. Lewis, of the Chicago, Burlington & Northern, in the same connection, bring out this feature prominently.

The circular goes on to suggest that the flattening of tires on main drivers may have had much to do with creating the impression that foreign tires are superior to those of domestic manufacture. A good many roads use foreign crucible tires on passenger engines and American open hearth tires on the rest of their motive power. As the most complaints of flattened tires have come from heavy freight engines, and as foreign tires are used on comparatively few such engines, it follows that the American tire has suffered from this cause to a greater extent than the foreign tire. The loss of mileage caused by this flattening and consequent turning down has greatly reduced the average mileage of American tires, while the foreign tire, not being used to the same extent in freight and switching service, has suffered much less from wasted mileage.

Station and Shop Notes.

The contract for building the passenger station for the Great Northern at Sauk Centre, Minn., has been let to Ring & Tobin, of Minneapolis, Minn.

The Tacoma shops of the Northern Pacific, located at Edison, Wash., will be started up about Jan. 1.

G. M. Deeks, of St. Paul, Minn., has been awarded the contract for building the passenger station for the Northern Pacific at Bozeman, Mont. The contract price is $7,000.

The new station of the Cincinnati, Hamilton & Dayton at Lima, O., is about ready for occupancy. It is of pressed brick with stone trimmings and has a covered platform alongside the track several hundred feet long. The main building is 25 × 60 ft.

The Wheeling & Lake Erie has let the contract to A. Bently, of Toledo, O., for new car shops, to cost $80,000. The site includes a little over 10 acres, and the new buildings will include new car shops, machine shop, 65 × 160 ft., an erecting shop, blacksmith shops, paint shop, a roundhouse, water works, storage rooms and a building for the general offices for the company. The work is being done under the supervision of Mr. C. A. Wilson, chief engineer. The company expects to have the works ready for use by Jan. 1. In the 10 acres of ground surrounding the buildings there will be built about two miles of track.

The Houston City Street Railroad Co. will build a large car house and car shops at Houston, Tex.

The proposed building will be 250 × 141 ft. in size, constructed of brick and located on the site of the powerhouse. The company will not only do all its own repairing, but will also construct street cars for use on its lines in Houston.

Car Heating.

The National Car Heating Co., of Kansas, which has offices at 436 The Rookery, Chicago, has issued a circular warning railroad companies against infringements of the car heating patents granted to J. C. C. Searle, originally on Oct. 4, 1887, and reissued Aug. 5, 1890; June 2, 1890, and Sept. 29, 1891. The patents cover a system of water heating apparatus of circulating pipes and an expansion chamber with an overflow leading from the water level of the chamber and a hand valve by which any surplus water may be removed without cooling the water in the circulating system and for retaining the heated water at a proper level.

Canadian Trans-Atlantic Mail Service.

The Canadian government has decided to call at once for new tenders for a fast line of steamers between Canada and Europe. The minimum rate of speed required is an average of 18 knots per hour from port to port, or alternative tenders for rates of speed of 19 and 20 knots respectively. The Canadian port of call in summer will be Quebec, and in winter, Halifax, or Halifax and St. John. The vessels must be at least 6,500 tons. Jan. 11 is fixed as the last day upon which tenders will be received at the Department of Finance.

The Gill-Alexander Individual Call Bell for Telegraph Offices.

This apparatus, which was described in the *Railroad Gazette* of March 13 last, is now in use on the Union Pacific, Southern Pacific, Canadian Pacific, Denver & Rio Grande, Missouri, Kansas & Texas, New Brunswick, Baltimore & Ohio and other roads. The proprietors, the Gill-Alexander Electric Co., of Kansas City, announce that the suit of the Electric Secret Service Co., of New York, against them in the Jackson County Court at Kansas City, Mo., has been dismissed. This suit related to the Hatch patents, in controversy between the two companies, and the decision dissolves the temporary injunction heretofore granted.

The testimonials printed in the circular of this company show that the Union Pacific now has in use 42 bells, 23 on the Kansas Division and 19 on the Nebraska Division. The Southern Pacific has 15 in use at stations where night operators were formerly employed. The Superintendent of Telegraph states that a considerable reduction in operating expenses has been effected without impairing the service. The Superintendent of Telegraph of the Union Pacific, writing of the machines, says:

> They all work perfectly, accomplish all you claim for them, and in nowise interfere with the regular business on the wires. At seven stations we are enabled by this system to dispense with night operators, the dispatcher being enabled to awaken the day operator for an occasional train order at night, while at the other points the day operators, who are also agents, having to be outside of the office and beyond the hearing of the sounder a great deal, can be called to the instrument when wanted for anything important, if the regular telegraph call fails to reach them, thus greatly improving the telegraph service at such stations at a very small cost. We expect to increase the number of bells.

Coupler Locks.

In our illustrations of various designs of unlocking devices for car couplers, Nov. 20, we showed the lifting mechanism for the Smillie coupler on the right hand side of the car, instead of on the left, where it is always placed. The illustration was reproduced from a photograph of a model which has the handle placed on the right hand side facing the car as a matter of convenience. The unlocking device of the Smillie coupler is always placed on the same side of the car as others; namely, on the left hand side facing the car.

The Cape Tormentine Breakwater.

The work at the breakwater at Cape Tormentine, N. B., has been closed for the year. During the past season eight cribs, 100 ft. in length and about 17 ft. deep each, have been sunk and 900 ft. of understructure built. The work is entirely finished now out to 2,900 ft. from the shore, 1,300 ft. of stone work and 1,600 of crib. One of the two angles at the end of the pier is complete and the second angle has been finished with the exception of three cribs which will be the last of the foundation work.

Proposed Electric City Railroads in Berlin.

The Universal Electricity Co. proposes to build three lines through Berlin in tunnels nine metres under the earth. The tunnels are to be iron lined with an outside coating of cement. Trains composed of one locomotive and three cars holding 40 people each are to start from each terminus every three minutes, making their tour at the rate of 15½ miles per hour, fare for the whole distance to be limited to 10 pfennigs. The estimated time required for construction is two years.

Air Brakes.

The New York Air Brake Co. has closed a contract with the Lehigh Valley for brake equipment for 2,000 box cars recently ordered by that railroad.

Ship Building on Lake Erie.

Contracts have recently been closed by the Globe Iron Works, of Cleveland, for a number of Lake craft. Among others is a steel steamer, for the Minnesota Steamship Co., measuring 330 ft. keel and 45 ft. beam, having triple expansion engines, the dimensions of the high pressure cylinder being 24 in. diameter and 48 in. stroke, the proportions of the second and third cylinders being of the usual gradation. This boat will ply between Two Harbors and South Chicago and Lake Erie ports. These works are also building two lighthouse tenders for the United States Lighthouse Board, one to be stationed at Portland, Me., the other at Astoria, for the North Pacific coast district. The steam yacht for H. M. Hanna, which measures 185 ft., will be finished and equipped with all the taste and skill available. When completed the owner proposes to make a trip up the Nile Another large ore carrier for Samuel Mitchell, of the Jackson iron mine, will be ready for next year's trade. The large fleet of transportation boats built here for the Great Northern present excellent features in their lines and general design of engines and machinery, as well as the finish, and are a decided addition to the fleet of the Great Lakes.

THE SCRAP HEAP.

Notes.

The train collector of the Cleveland, Cincinnati, Chicago & St. Louis recently arrested at Cincinnati for selling tickets and appropriating the proceeds has confessed his guilt.

A passenger train was derailed by the breakage of a tire on the Orel Graise Railroad in Russia Nov. 24 and 5 cars were thrown off a bridge into the River Optoukha, killing 25 or more passengers.

A lady, who was shot by a negro last October, while on an excursion train on the Louisville & Nashville and was permanently injured, has obtained a verdict for $18,000 damages against the road.

The district court of the parish of Nachitoches, La., has imposed a fine of $6,000 on the Texas & Pacific for failing to comply with the law relative to the placing of bulletin boards at all stations where telegraph operators are employed.

The Northern Pacific is preparing for the erection, in Tacoma, Wash., of the Northern Pacific Beneficial Association's new hospital for the western end of the road. Work will begin early next spring on the building, which will be of brick, accommodating 300 patients, and will cost $50,000.

A considerable number of the older officers and employés of the Pittsburgh Division of the Pennsylvania Railroad, including some who were formerly in its service but have now left it, are forming a veterans' organization, to include all employés who have served the road more than a certain number of years.

Masked robbers stopped a St. Louis & San Francisco train near Glendale, 10 miles from St. Louis, Mo., on the evening of Nov. 30, and robbed the express car of $20,000 to $75,000, using dynamite to force open the doors which were defended by the messenger for some time. While two robbers rifled the safes the other four held the passengers at bay, firing 14 shots into the smoking car.

On the morning of Nov. 26, the Soo line elevator at Gladstone, Mich., caught fire from sparks and together with its contents, 100,000 bushels of wheat, was totally destroyed. The fire extended to the flour sheds and consumed 10,000 barrels of flour. A large amount of coal was destroyed before the fire was brought under control.

A man has been arrested at Buena Vista, Va., for tying a bull upon the tracks of the Norfolk & Western to be killed by a train. It is said that the prisoner confessed, stating that he acted under instructions of his employer, who "preferred the Norfolk & Western to the Chesapeake & Ohio, because damages could be collected more easily from the former company."

On Friday of last week a fight between a local freight train crew and a gang of Italians employed on a work train at Yorkville, O., on the Chicago & Erie, resulted in the serious wounding of five of the participants. It appears from the account that one of the methods of warfare was to back a car violently against the boarding car occupied by the Italians.

Three laborers on the Northern Pacific have made affidavit at Tacoma, Wash., that twenty-five or more men were killed by the landslide at Canton Station, on the line of the Northern Pacific, Nov. 25. The statement was published that a large number of men, clearing the track after a storm, had been thus killed, and later it was reported that only two were killed.

A dispatch from Carson, Nev., states that a passenger has been awarded by a jury $44,750 damages for false arrest when he refused to leave a Southern Pacific train because his signature on an ironclad ticket was discredited by the conductor. When the conductor endeavored to arrest him he defended himself with a revolver, but when tried on the criminal charge of assault with a deadly weapon he was acquitted.

The company operating the Chicago cable railroads recently distributed $975 in gold among the gripmen. Three prizes are annually offered by the company, of $100, $75 and $50 each, to gripmen with the best annual record. On examination it was found that nine gripmen had a record without accident or complaint, and that twelve others were entitled to either first or second prizes. The nine received $75 and the other twelve $25 each making a total of $975 awarded, instead of $225 promised.

Judge Brown, of the United States Court at New York, has rendered the following decision in the case of John A. Haddock vs. The Delaware, Lackawanna & Western, in which suit testimony is being taken before a Commissioner on Mr. Haddock's allegation that the company has discriminated against him as a shipper of anthracite coal, the officers of the company having refused on advice of counsel to answer questions relating to the cost of transporting coal: "All questions as to the cost of coal mined by the company or as to its method of conducting its business as a coal producer and as a carrier, or questions as to the company's accounts of costs, profits or losses in either department of its business, are for the present disallowed as being evidence of an inferior order, and not in the first instance competent as proof concerning what is a reasonable charge for coal transportation westward and northward, but competent, if at all, only as a last resort, and in the absence of all means of proof by ordinary legal evidence."

LOCOMOTIVE BUILDING.

The Old Colony Railroad has just contracted for building 10 of its standard passenger locomotives. Six moguls will be built in their own shops at South Boston.

The Richmond Locomotive & Machine Works have an order from the Chesapeake & Ohio for 11 locomotives with ten wheels and 19 × 24 in. cylinders. This is in addition to ten large engines ordered some months ago, five of which were delivered last month.

The Chicago, St. Paul, Minneapolis & Omaha has just received from the Baldwin Locomotive Works a consolidation locomotive which will be used in freight service between Minneapolis and t. Paul. This company has had a duplicate engine in use in St. Paul in similar service for a year and a half. The engine will weigh when in service 150,000 lbs.; weight on drivers, 135,000 lbs.; tender, with fuel and water, 72,000 lbs. The boiler is straight and 72 in. in diameter, and has 271 2¼-in. flues. The engine is equipped with American driver brakes and Ashton muffled valves.

CAR BUILDING.

The Barney & Smith Mfg. Co. is building two sleeping cars for the St. Paul & Duluth.

The Missouri Pacific has given an order for 100 furniture cars to the St. Charles Car Co.

The Lake Shore & Michigan Southern is having 25 passenger cars built by the Barney & Smith Mfg. Co., of Dayton, O.

The Pullman Palace Car Co. has booked an order from the Philadelphia & Reading for 100 passenger and 4,000 freight cars.

The Atchison, Topeka & Santa Fe has, it is understood, placed an order for 500 box cars with the St. Charles Car Co., St. Charles, Mo.

The Litchfield Car & Machine Works, Litchfield, Ill., are building 500 freight cars for their own use, to be leased or sold to roads having need of more cars.

The Old Colony Railroad has contracted with the Wason Car Co., of Springfield, Mass., for the construction, during the winter, of 35 first-class passenger cars and 100 freight cars.

The Pullman Palace Car Co. has taken orders for 20 Chicago & Eastern Illinois vestibuled cars; also for 10 chair cars for the Chicago & Alton, and 25 passenger cars for the Rio Grande Western.

The Algiers shops of the Southern Pacific have just completed an order for 300 platform cars for the Southern Pacific. The cars are of 60,000 lbs. capacity and the order was begun three months ago.

The Central of New Jersey has awarded a contract to the Lehigh Valley Car Works, of Stemton, Pa., to build 500 gondola coal cars. Bids are also being received to build 25 60 ft. passenger cars, similar in design to the 25 cars built for the road by the Pullman Car Co. last year.

The Chicago, Rock Island & Pacific has placed an order for 1,200 freight cars, 500 of which are box cars, to be built from the company's designs; also 500 furniture cars and 200 stock cars. Of these 700 were awarded to the Wells & French Car Co., of Chicago, and the balance to the Peninsula Car Co., of Detroit.

The Pennsylvania has let contracts for freight cars as follows: Michigan Car Co., 750; Peninsular Car Co., 750; Erie Car Works, 500; Buffalo Car Co., 500; Barney & Smith Mfg. Co., 500; Murray Dougal Co., Milton, Pa., 500, and the Terre Haute Mfg. Co., 500 cars. The company will build 1,500 cars at its shops east of Pittsburgh.

The Pullman shops are very busy on orders for freight and passenger cars. Some of the most recent orders received by the manufacturing department are given in the following list: One baggage car for the Denver & Rio Grande; 20 chair cars for the Chicago, Burlington & Quincy; 100 Pullman standard coal cars for the Du Quoin Transportation Co.; one vestibuled combination passenger and baggage car for the New York, Lake Erie & Western; five passenger and three parlor cars for the Columbus, Hocking Valley & Toledo; one combination baggage and mail car for the Toledo, Columbus & Cincinnati; two passenger cars for the Toledo & Ohio Central; five first class vestibuled cars and five first class cars without vestibules for the Chicago, Rock Island & Pacific; three first class and three second class cars, and three combination passenger and baggage cars for the Rio Grande Western; 10 first class passenger and 10 suburban cars for the Chicago & Eastern Illinois, and one vestibuled combination passenger and baggage car and two sets of six-wheel trucks for the Old Colony.

BRIDGE BUILDING.

Bridgewater, N. S.—The new bridge over the La Have River, at Bridgewater, N. S., is being rapidly placed in position, the bridge builders having a large force at work on the iron work.

Camden County, N. J.—City Surveyor Farnham's plan for the erection of a new bridge over Cooper's Creek at Federal street has been adopted and the bridge committee instructed to advertise for proposals for the erection of the structure.

Corpus Christi, Tex.—The county commissioners have decided to construct an iron bridge over the Santa Gertrude and one over the Peronia at a cost of $6,700.

Crosswicks, Pa.—The contract for the new iron bridge over Crosswicks Creek, at Crosswicks, has been awarded to the New Jersey Steel & Iron Co., of Trenton, N. J.

Elgin County, Ont.—The principle question to be considered at the meeting of the Elgin County Council next week is the building of a bridge over the River Canard.

Esquimalt, B. C.—The new bridge that spans the Cowichan River on the line of the Esquimalt & Nanaimo Railroad, British Columbia, is now complete. The span is a combination, 220 ft. long, with a width of 20 ft. out to out and a clear roadway of 15 ft. Its central elevation is 44 ft. and at the ends 36 ft. There is in the span 94,000 ft. of Douglas fir timber, all of which is dressed and painted with two coats of white-lead paint. There are also in the structure 60 tons of steel and wrought iron and 15 tons of cast iron, all castings being in compression only. It is the only span of its kind in British Columbia and was introduced by Mr. West, formerly partner of Chas. Williams & Co., who has built many of them in the United States. All the iron work was manufactured by the Albion Iron Works Co., of Victoria, B. C.

Hoboken, N. J.—The New York & New Jersey Construction Co., with a capital stock of $500,000, has been chartered in New Jersey by George W. Green, of Goshen; George Young, of the St. Cloud Hotel, New York; James W. Husted, of Peekskill; Anthony Barrett, of Brooklyn, and James W. Whitney, of Rochester. The purpose of the company is to engage in bridge construction work. The principal office will be at 1 Newark street, Hoboken.

May's Landing, N. J.—The large iron drawbridge, which is being built across the Mullica River, and connects Atlantic and Burlington counties, will not be accepted from the contractors, on account of the cement used in the cylinders being, as alleged, of bad quality. The bridge is nearly completed and several thousand dollars will have to be expended to repair the iron cylinders, which the contractors have consented to do.

Monkton, Md.—The examiners have reported favorably upon the building of an iron bridge over Little Gunpowder Falls, near Monkton. It will have a span of 60 ft and floor of 16 ft. The cost will be $1,000 for the superstructure and $800 for the masonry, to be shared by Baltimore and Harford counties, which it will connect.

New Brunswick, N. J.—The freeholders have appointed an engineer to draw up plans for a bridge across the Raritan River to cost $100,000. There is much opposition to the building of the bridge, the resolution to erect it having been passed a month ago by but one majority in the board.

Pittsburgh, Pa.—The special committee on free bridges has directed the department of public works to examine a location for a bridge over the Monongahela River, to be situated between the Tenth street and Smithfield street bridges, and the estimated cost of a bridge in that location.

Plymouth, Pa.—The Plymouth Bridge Co., of Wilkesbarre, has been organized by Samuel P. White and Joseph F. Mitchell, New Brighton, Pa.; Lucien L. Gilbert, Allegheny; Thomas R. Phillips, Kingston, Pa., and Stanley W. Davenport, Plymouth.

Portland, Or.—The City Council has purchased the bridge spanning the Willamette River between Portland and East Portland at Madison street. The purchase price was $145,000.

Rock Dale, Tex.—A company is reported organized at Rock Dale, with a capital stock of $100,000, to manufacture the patent self-supporting suspension bridge of J. O. Hill and W. B. Woodey.

Toronto, Ont.—The by-law to raise $250,000 to construct a high level bridge over the Don River at King street, Toronto, will be voted at the municipal elections. The Canadian Pacific will agree to pay more than one-twenty-fifth of the cost of the Don bridge, or about $10,000. In view of this there is little hope of the amicable arrangement of the proportion of cost to be borne by the city and railroads. The position taken by the city is that as the building of the railroads made the bridge necessary the companies should pay the chief portion of the cost of construction.

Wheeling, W. Va.—Both bridges of the Wheeling Bridge Co., crossing the Ohio River, between Wheeling and Martins Ferry, O., have been completed and are now in use. The Wheeling electric railroad company crosses both bridges with its rapid transit trains between Wheeling and the Ohio suburb. It is now announced that the company has in contemplation the building of another highway bridge across the Ohio River, between the lower end of Wheeling and Bellaire with the view to running the street railroad in the form of a loop from Wheeling to Martins Ferry, thence to Bellaire and back to Wheeling.

Windsor, N. S.—The Windsor & Annapolis railroad is erecting a new steel plate girder bridge 55 ft. in length over Kentville Brook. It is a box bridge similar to that over the Cornwallis River. Both bridges were built by the Dominion Bridge Co., of Lachine, Que.

Woodstock, N. B.—David Brown, C. E., has made a report respecting the proposed site for the Woodstock bridge, recommending that it be built at the King street site. This will be a more expensive but a much better location than the previous one. It is thought that the new structure will be of stone and iron.

Wytopitlock, Me.—The county commissioners of Penobscot and Aroostook counties have decided to build an iron bridge over the Mattawamkeag River between Drew and Reed plantations, and the contract has been given to the Groton Bridge & Mfg. Co. The new bridge will be 324 ft. long, with iron abutments and piers. The trestle approaches will be 160 ft. in length. The site of the bridge is near Wytopitlock. The bridge will cost $35,000, the state and counties contributing $15,500 and the plantations the rest.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Ohio the Supreme Court decides that under the statute authorizing cities or villages to enter upon and hold real estate within their corporate limits for "necessary offices" and for "prisons," municipal corporations may appropriate, for necessary public offices or a prison, land of a railroad company which is not needed or used in the operation of its road or the conduct of its business.[1]

The Supreme Court of Pennsylvania rules that where a railroad for whose use toll is paid by another road lies wholly within the state, the tax on such tolls does not constitute a tax on interstate commerce, by reason merely of the fact that the lessee road is engaged in interstate transportation, and it is for this use that tolls are paid.[2]

In Texas the Supreme Court holds that the statute imposing penalty for refusing to deliver freight on payment or tender of the charges shown in the bill of lading, is not unconstitutional as a regulation of interstate commerce, though applied to freight shipped from a point without the state.[3]

The Supreme Court of Vermont holds that a contract by which a railroad company, before the passage of the interstate commerce act, discriminates by agreeing to allow a certain shipper a rebate on freight charges, is not valid and enforceable at common law, and is not such a contract as could be impaired by the interstate commerce act prohibiting such discrimination.[4]

Carriage of Goods and Injuries to Property.

In Texas the Supreme Court holds that a stipulation in a bill of lading requiring a shipper to give notice within a certain time if he claims damages does not apply to a

claim accruing under a prior verbal contract before the bill of lading was signed.[5]

The Supreme Court, of North Carolina, decides that under the statute providing that common carriers may require prepayment of freight in all cases, a railroad company may lawfully refuse to receive freight offered by a connecting company without prepayment, though it does not demand prepayment of others, if the connecting railroad has notice that prepayment is required.[6]

A number of decisions have been recently made in regard to contracts limiting liability. In Nebraska it is held that a carrier cannot by contract with a shipper relieve itself, either in whole or in part, from liability for injury or loss resulting from its own negligence. And in two cases in Texas the following agreements have been held void: A stipulation in a through bill of lading that the railroad shall not be liable for loss caused by negligence beyond its own line; a stipulation that the shipper shall not recover for loss or injury unless he gives written notice thereof to the officers of the company before the cattle are removed from the place of destination, and before they have been mingled with other stock; and a provision that, when the carrier furnishes the shipper with laborers to assist in loading and unloading his goods, they shall be deemed the shipper's servants while so engaged, and that the carrier shall not be responsible for their acts.[7]

In Texas it is held by the Supreme Court that though the statute imposes a penalty on railroad companies for failure to furnish freight cars after demand therefor in writing, an action will lie for the breach of an oral contract to furnish cars.[8]

The New York Supreme Court decides that in ascertaining the compensation to be made to the owner of a lot on a corner formed by the intersection of two streets at right angles, for so much of his easement or privilege in one of the streets as had been taken by an elevated railroad company in the construction and operation of its road, the street space affected is properly determined by a line drawn from said corner of the two streets to the corner diagonally opposite.[9]

[1] Cincinnati, S. & C. R. Co. v. Village of Belle Centre, O., 27 N. E. Rep., 464.
[2] Commonwealth, v. N. Y., P. & O. R. Co., 22 Atl. Rep., 212.
[3] Ft. W. & D. R. Co. v. Lillard, 16 S. W. Rep., 654.
[4] Fitzgerald v. Grand Trunk R. Co., 22 Atl. Rep., 76.
[5] M. K. & T. Ry. Co. v. Graves, 16 S. W. Rep., 102.
[6] Randall v. R. & D. R. Co., 13 S. E. Rep., 137.
[7] C. R. I. & P. R. Co. v. Witty, 49 N W. Rep., 183; G. C. & S. F. R. Co. v. Vaughn, 16 S. W Rep., 775; Mo. Pac. R. Co. v. Smith, 16 S. W. Rep., 803.
[8] Missouri Pac. Ry. Co. v. Harmonson, 16 S. W. Rep., 539.
[9] Metropolitan Ry. Co. v. Levy, 13 N. Y. S., 367.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Lowell, semi-annual, $3.50 per share, payable Jan. 1.

Chicago & Eastern Illinois, quarterly, 1½ per cent. on the preferred stock, payable Jan. 2.

Chicago & Northwestern, quarterly, 1¾ per cent. on the preferred stock, and semi-annual, 3 per cent. on the common stock, payable Dec. 26.

Chicago, St. Paul, Minneapolis & Omaha, semi-annual, 3 per cent. on the preferred stock, payable Jan. 20.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on the preferred stock, payable Jan. 2; and semi-annual, 1½ per cent. on the common stock, payable Jan. 11.

Delaware & Hudson Canal Co., quarterly, 1¾ per cent., payable Dec. 15.

Kansas City, Fort Scott & Memphis, 2½ per cent. on the preferred stock.

Little Miami, $1 per share, payable Dec. 15.

New York, Lake Erie & Western, 3 per cent. on the preferred stock, payable Jan. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama Great Southern, special, Birmingham, Ala., Dec. 15.

Atlantic & Danville, annual, Portsmouth, Va., Dec. 15.

Atlantic & Pacific, annual, 95 Milk street, Boston, Mass., Dec. 10.

Boston & Maine, annual, Lawrence, Mass., Dec. 9.

Lehigh & Hudson River, annual, 80 Broadway, New York City, Dec. 7.

Richmond & West Point Terminal, annual, Richmond, Va., Dec. 18.

Rome, Watertown & Ogdensburg, annual, 96 Broadway, New York City, Dec. 28.

Ulster & Delaware, annual, Roundout, N. Y., Dec. 8.

Utica & Black River, annual, Grand Central Station, New York City, Dec. 28.

Virginia Midland, annual, Alexandria, Va., Dec. 16.

Walkill Valley, annual, 5 Vanderbilt avenue, New York City, Dec. 9.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* will hold its next meeting at the United States Hotel, Beach street, Boston, Mass., Dec. 9. Commencing January, 1892, the regular meetings of the club will be held on the second Monday of each alternate month.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings at its rooms in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

American Society of Civil Engineers.

A regular meeting was held Dec. 2. Mr. J. A. L. Waddell presented, through the secretary, a very long and important paper on "Disputed Points in Railway Bridge Designing." Several written discussions had been received, and some of them were read. We shall attempt no abstract of the paper or discussions now, as to be of any value it should be very full. It is enough to say that Mr. Waddell pitches into the best modern practice in various particulars, and invites the fullest discussion. For instance, he would cease to use the method of engine concentrations and take instead equivalent uniform loads. The paper is sure to make a good deal of stir. Mr. Blakeley (Passaic Rolling Mill Co.) made a short verbal discussion, and Messrs. Breithaupt and Seamen read discussions.

Ballots for members were canvassed, and the following elected:

Members: Daniel Burke Dunn, Chief Engineer constructing Macon, Dublin & Savannah R. R., Macon, Ga.; Fred. Putnam Spalding, Engineer in charge of Rock Creek Park, Washington, D. C.; James W. Way, Chief Engineer Missouri Pacific Ry., St. Louis, Mo.

Associate Members: George Goodell Earl, Consulting Engineer Montgomery, Ala.; Oscar Erlandsen, Assistant Chief Engineer Construction Dutchess County R. R., Poughkeepsie, N. Y.; George Thomas Richards, Assistant Engineer on Construction of new Sixth St. Highway Bridge, Pittsburgh, Pa; William Watmough Thayer, Surveyor of the Fourth District of Philadelphia, Pa.

Canadian Electrical Association.

A Canadian Electrical Association was organized at Toronto, Ont., last week. The officers are: President, J. J. Wright; First Vice-President, John Carrol; Second Vice-President, H. J. Dunstan, and Secretary and Treasurer, C. H. Mortimer. The first annual meeting will be held in Hamilton, Ont., on the second Tuesday in June.

Central Railway Club.

The November meeting of the Central Railway Club was held at the Hotel Iroquois in Buffalo on Wednesday, Nov. 25.

The committee report on "wheel gauges and wheel defects" was presented by Mr. J. R. Petrie. It was accompanied by diagrams and sections of wheels with worn flanges, and recommended alterations in the test gauge which will allow wheels to run with sharp flanges which are not worn vertical or to such an extent as to make them unsafe. The committee stated that in applying the improved gauge to eight pairs of wheels taken out by the Nickel Plate five pairs would have passed inspection. It was thought best that the report, with blueprint illustrations, should be sent each member and that they make personal tests, so as to be able to make suggestions at the next meeting.

The report of the special committee on "Wrong Drawbars" was presented by Mr. A. M. Waitt, of the Lake Shore, who said that answers had been received from a territory extending from the Atlantic to the Pacific, and a remarkable harmony of opinion on the subject existed. The report advocated uniformity in drawbars and a rigid adherence to the standards of the Master Carbuilders' Association. They believed that in replacing drawbars the new one should correspond in material, general dimensions and method of attachment to the one removed. They recommended the adoption of the following rules:

Hereafter in the interchange of cars with connecting roads, cars having mixed or wrong drawbars will be received without a defect card, if they are in good condition and fit properly, except in the following cases:

First—Cars having a M. C. B. standard drawbar replaced by one of a different type.

Second—Cars having a link-and-pin drawbar replaced by one made of different material.

Third—Cars having a link-and-pin drawbar replaced by one having a different method of attachment to draught rigging.

Fourth—Cars having a link-and-pin drawbar replaced by one of essentially different dimensions and weight.

In each of the above cases a M. C. B. defect card may be required from the delivering road covering the wrong drawbar, the card to show in what general manner the replaced drawbar differs from the original which was in the car.

The recommendation of the committee was adopted.

The committee on "worn-out brake-shoes," consisting of Messrs. Peter Smith, Robert Potts and A. Dolbeer, presented a report, in which they said: "The M. C. B. rules governing brake-shoes are all right as far as they relate to three-eighths or less in centre, but should be extended so as to cover other failures in brake-shoes. We find a large number of brake-shoes that retain the three-eighths limit in centre, and are worn tapering on bottom and top ends, endangering the wear of blocks or heads; also shoes worn to very thin edge and leaving one-third of the shoe in good condition. We think such shoes should be condemned. The fact is conceded that shoes worn down one-sided interfere with the efficiency of the braking power. Your committee is not in favor of turning shoes that have been worn on one side, as they are liable to destroy the wheels, as the bearing would come in throat of wheel and interfere with proper adjustment of brakes." The consideration of the report was postponed to the next meeting.

It was decided to hold the annual banquet on the fourth Wednesday of January, and the committee of last year, with Mr. T. A. Bissell as chairman, was continued.

New England Railroad Club.

The regular meeting of the club will be held at the United States Hotel, Boston, Wednesday, Dec. 9, 1891, at 7:30 p. m. The subject for discussion is "Tools and Machinery for Railroad Work."

Northwestern Track and Bridge Association.

The next meeting of the Northwestern Track and Bridge Association will be held in the Directors' room of the St. Paul Union Station at 2:30 p. m., on Friday, Dec. 11. The discussion of Mr. Rafferty's paper will be completed and two new papers will be presented: "Form of Construction of a Trestle Crossing," Mr. B. T. McIver, S. B. & B., St. P. & D.; "Frogs," H. A. Buell, R. M., C., M. & St. P. Supper will be provided for all attending members and the evening will be passed in informal session.

The Civil Engineers' Club of Cleveland.

A regular meeting was held on Tuesday evening, Nov. 10, with President Gobeille in the chair and 25 members and three visitors present. Mr. C. M. Barber reported that 80 members and guests were present on the last visiting day. Two excellent reports on the last visiting day were read, one by Mr. E. P. Roberts on the Power House of the Broadway & Newburgh Street Railroad, and the other by Mr. George E. Gifford on the Cleveland Rolling Mill Company's plant. Both reports were carefully prepared and were full of valuable information.

The paper of the evening was by Prof. Frank H. Neff, entitled French Roads—their administration, construction and maintenance. It contains an elaborate and detailed account of these celebrated roads. A number of members took part in the discussion.

PERSONAL.

— Mr. W. H. Bliss, General Solicitor of the St. Paul & Duluth, has resigned.

—Mr. H. R. Bishop, President of the Duluth & Iron Range, has resigned on account of ill health. Mr. M. J. Carpenter, vice president, succeeds Mr. Porter, and is in turn succeeded by Mr. C. W. Hillard, formerly secretary of the company.

—Mr. W. E. Gregory, an old citizen and railroader of Galveston, Tex., died there recently at the age of 64 years. In 1864 he became the Ticket Agent of the Galveston, Houston & Henderson at Houston and later he was promoted to the General Freight Agency, and subsequently made General Manager. He removed to Galveston in 1867.

—Mr. John Durand, who died at Avolon, Pa., Nov. 25, aged 72 years, was at one time General Superintendent of the Hartford & New Haven Railroad. Later he held similar positions on the Pan Handle, Cleveland & Pittsburgh and other roads. He was General Superintendent of the Houston & Texas Central, from which he retired to private life.

—Mr. W. C. Rinearson, General Passenger Agent of the New York, Lake Erie & Western, has resigned to accept, it is stated, a position in the traffic department of the East Tennessee, Virginia & Georgia. His resignation is to take effect Dec. 15 and he will probably be succeeded on the Erie by Mr. D. I. Roberts, who has been Assistant General Passenger Agent at Chicago.

—Mr. L. M. Schwan was this week elected Vice-President of the Lake Erie & Western, to succeed Mr. Nelson Robinson, who declined a re-election. Mr. Schwan has been Secretary and Treasurer of the company for many years. In his promotion the directors express their appreciation of his faithful and intelligent services. Mr. Schwan is also Secretary of the East Tennessee, Virginia & Georgia and of the Cincinnati Southern.

—Mr. R. J. Duncan, who was appointed about a year ago General Superintendent of the Union Pacific, Denver & Gulf, to succeed Mr. Channing F. Meek, resigned last week. Mr. Duncan was promoted from the superintendency of the Fort Worth & Denver City road on the resignation of Mr. Meek, soon after the change in the control of the Union Pacific. The new General Superintendent of the road is Mr. W. D. Moore, who has been Superintendent of the Grand Island Division of the Union Pacific.

—Col. Enoch Ensley, prominently identified with the development of the iron industry in the south, died last week at Memphis, Tenn., aged 57 years. In 1881 Colonel Ensley, together with other citizens of Memphis, purchased the Pratt Coal & Coke Company property, at the

same time moving to Birmingham, Ala., where later he brought about a consolidation with the Alice Furnace property, and ultimately these were merged with the Tennessee Coal, Iron & Railroad Co., of which he was the first president. He organized the Lady Ensley Coal, Iron & Railroad Co., and was also largely interested in Birmingham enterprises.

ELECTIONS AND APPOINTMENTS.

Boston & Maine.—H. E. Chamberlain has been appointed Superintendent of the Concord division, vice George E. Todd, resigned (temporarily) on account of ill health.

Bridge & Saco River.—The annual meeting of the stockholders was held last week, and the old officers were re-elected: W. T. Perry, President; P. P. Burnham, Treasurer; Joseph A. Bennett, Superintendent, General Ticket and Freight Agent and Clerk.

Chicago, Burlington & Quincy.—John H. Jackson, General Agent at St. Paul, Minn., having resigned to engage in other business, E. A. Cardell, Traveling Freight Agent, has been appointed to succeed him.

Duluth & Iron Range.—H. R. Bishop, having retired from the presidency on account of ill health, M. J. Carpenter, Vice-President, has succeeded to that position. C. W. Hillard, Secretary of the company, becomes Vice-President.

Franklin & Megantic.—At the annual meeting of the stockholders the old directors were re-elected, with this exception, Allen Blanchard of Stratton and A. V. Hinds of Kingfield, Me., were chosen directors in the place of N. B. Bryant and Orren Tufts.

Illinois Central.—T. P. Bellows has been appointed Division Superintendent of the Louisiana division, vice J. M. Turner, resigned.

Lake Erie & Western.—The office of Master of Transportation has been abolished. O. W. Bell has been appointed Superintendent of the Sandusky division, with headquarters at Lima, O., and O. E. Grady, Superintendent of the Peoria division, with headquarters at Lafayette, Ind.

Los Angeles.—C. Shanks has been appointed Master Mechanic and Master Car Builder of the road in place of George E. Mosher, resigned. Mr. Shanks has heretofore been located at National City, Cal.

Missouri, Kansas & Texas.—The traffic department has been organized by the following appointments: A. S. Dodge, formerly General Freight Agent, to be Traffic Manager at St. Louis; C. Haile, General Freight Agent at St. Louis; J. W. Allen, General Freight Agent for Missouri, at Sedalia; C. P. Rector, General Freight Agent for Kansas and Indian Territory, at Parsons, Kan.; John A. Smith, General Freight Agent for Texas; Gaston Meslier, General Passenger and Ticket Agent, with office at Parsons, Kan., in charge of interstate rates and divisions; W. G. Graham, General Passenger Agent for Missouri, at Sedalia; H. B. Hughes, General Passenger Agent for Texas; E. B. Parker, Assistant Passenger Agent at St. Louis, with supervision over advertising, and A. T. Drew, General Traffic Claim Agent, with headquarters at Parsons, Kan.

North Carolina Midland.—At the stockholders' meeting at Winston, N. C., the following directors were elected: John H. Inman, W. G. Oakman, C. S. Price, W. G. Rutherford, New York; J. T. Morehead, Leaksville; Col. A. B. Andrews, Raleigh; T. B. Bailey, F. M. Johnson and W. C. Wilson, Mocksville; J. W. Fries, Salem: G. W. Henshaw, Winston. The directors elected the following officers: A. B. Andrews, President; Maj. J. T. Morehead, Vice-President; H. W. Miller, Secretary; John W. Hall, Treasurer; Capt. W. H. Green, General Manager.

Parkersburg Branch.—The annual meeting was held in Parkersburg, W. Va., Nov. 24, and the following directors were elected: Orlando Smith, President; J. N. Camden, W. N. Chancellor, C. H. Shatteck, W. H. Blackford, W. F. Brown, Robt. Garrett, Andrew Pierce, W. W. Taylor, W. C. Winebrearer and T. S. Spates.

St. Paul & Duluth.—Messrs. Lusk, Bunn & Hadley have been appointed General Solicitors, vice W. H. Bliss, resigned.

Sandy River.—At the annual meeting at Phillips, Me., last week, the following officers were elected: N. B. Beal, President; D. M. Bohney, Clerk; N. B. Beal, Superintendent; J. E. Thompson, Treasurer, and General Ticket Agent. Directors: N. B. Beal, D. M. Bonney, W. D. Sewall, Joel Wilbur and J. H. Bonney.

Seattle, Boise & Salt Lake.—At the annual meeting of the stockholders in Payette, Idaho, the following directors were elected: Thomas W. Bates, A. B. Moss, M. L. Sproat, J. H. Richards, Payette; Martin Patrie, Blackfoot, Idaho; Joseph Pinkham, Boise City, Idaho. The directors elected the following officers: Thomas W. Bates, President; A. B. Moss, Vice-President: M. L. Sproat, Secretary; Joseph Pinkham, Treasurer.

Union Pacific—W. A. Deuel has been appointed General Superintendent of the Gulf Division, with office at Denver, vice R. J. Duncan, resigned. J. D. Moore has been appointed General Superintendent of the lines of this company in Texas, vice O. O. Winter, resigned. Headquarters will be at Fort Worth, Tex. A. W. Scribner has been appointed Tax Commissioner with headquarters at Omaha, Neb.

Wilmington, Columbia & Augusta.—The stockholders met in Wilmington, N. C., Nov. 19, and re-elected the old Board of Directors as follows: W. T. Walters, B. F Newcomer, Enoch Pratt, H. B. Plant, Geo. C. Jenkins, J. T. Barron and H. Walters. These officers were elected: President, Warren G. Elliott; Vice-Presidents, B. F. Newcomer and H. Walters, and Secretary and Treasurer, James F. Post, Jr. Warren G. Elliott succeeds W. T. Walters as President.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Albuquerque & Durango.—A surveying party has started from Albuquerque, N. M., to meet the party now in the field locating the line of the Albuquerque & Durango Railroad. It is believed that the survey will be completed during the winter.

Altoona & Wopsononock.—The stockholders at a meeting at Altoona, Pa., Nov. 24, authorized the issuance of a mortgage for $60,000 in favor of the Pennsylvania Trust Co., of Reading. The road is a narrow gauge and extends from Altoona eight miles up to one of the highest peaks of the Allegheney Mountains, where a large hotel and summer resort has been built. The road will be extended nine miles further to bituminous coal fields near Frugality, Pa. Part of the line has been graded.

British Columbia Southern.—This company gives notice of application to the Dominion Government for power to extend its line from its proposed eastern terminus in the Crow's Nest Pass in an easterly direction to a point on the line of the Calgary & Edmonton.

Brunswick, Western & Southern.—The engineers under charge of W. G. MacRae, who recently began a preliminary survey for this road south of Wilmington, N. C., have reached a point in the neighborhood of Town Creek, 12 miles from Southport, and it is expected to complete the survey to Southport next week. The line is being permanently located as the survey is made. At an election Dec. 22, Brunswick County will be asked to vote a subscription of $100,000. The General Manager states that in the event that Brunswick County does not vote the subscription, the company will build a line down the New Hanover side of the Cape Fear River to deep water. The company, however, has purchased over 400 acres of terminal property at Southport and has already organized a terminal company. H. H. Dougherty is General Manager.

Chicago & Eastern Illinois.—The Shelbyville extension was completed Dec. 1, when the last track was laid near Shelbyville Ill., and a train was run over the extension from Tuscola. The new road forms a new route between Chicago and St. Louis, as it connects with the Cleveland, Cincinnati, Chicago & St. Louis at Shelbyville. The extension is 37 miles long.

Chicago, Indianapolis & Chattanooga Southern.—The projectors of this road state that it is expected that the contracts will be let in the spring of next year for building the great part of the line between Indianapolis and Rockport, Ind. The right of way is being secured by the company and several of the counties will soon hold elections on propositions to vote bonds in aid of the project. The line is about 172 miles long and has been surveyed from Rockport through Grand View, Newtonville, St. Meinrad, Ferdinand, Mitchell, Bedford and Nashville. On this route three tunnels will be necessary, aggregating 3,600 ft. The maximum grade is 60 ft. per mile and the maximum curves eight degrees.

Chicago & West Michigan.—On the extension north of Traverse City the track is laid and is being ballasted from Traverse City to Elk Rapids, 20 miles, and from Charlevoix to within four miles of Petoskey, Mich., the track has been laid and is being ballasted. The grading is finished to Petoskey ready for track. Tracklaying began on the main line, extending north from Williamsburg, the first part of last week and will be pushed as fast as the weather will permit. Work has begun on the foundation for the drawbridge at Charlevoix and is being vigorously pushed by the contractor, J. M. Allmendinger, of Benton Harbor, Mich., who has the contract for putting in the entire foundation. The grading on the entire line has been nearly finished and unless much snow falls should be finished by Jan. 1.

Cleveland, Cincinnati, Chicago & St. Louis.—The company is working on the second track on the Cincinnati division, which will shortly be extended as far as Sharon, O. The second track is being built to increase the facilities for running the commutation trains out of Cincinnati.

Dansville & Mount Morris.—The Western New York & Pennsylvania is building 1,657 ft. of new track 3½ miles south of Mount Morris, N. Y., to a connection with this road, and the Delaware, Lackawanna & Western is reported to be also building a short connecting track from a point 1½ miles beyond Groveland. The Western New York & Pennsylvania has completed a traffic arrangement with the company, and through cars between Dansville and Rochester will begin running this week. As the company does not own any equipment, no trains have been running since the Erie took off its trains.

Duluth & Iron Range.—It is reported that this company will build a branch to the iron mines of the Mesabi range. A large force of men is now employed in the construction of a new ore dock at Two Harbors, Minn.

Duluth & Winnipeg.—Over 350 teams are at work on the two and a half miles of grading leading from Short Line Junction to the approaches of the St. Louis bridge, near Duluth, one of the contractors recently said, and it is calculated that the work will be ready for the construction train in three weeks. On the trestle approach on the Minnesota side of the draw about 900 ft. of the 2,250 ft. of the approach is completed. The contract will require 1,100,000 ft. of lumber and 1,200 piles. This work will be completed before Feb. 1. The track will be laid as soon as the grading is finished and extended on the approach as fast as possible. The approach on the Wisconsin side, 1,350 ft. long, is not yet under contract. The first regular passenger train over the road into Duluth was run last week going over the St. Paul & Duluth track from Short Line Junction. This train runs between Deer Lake, the end of the track, and Duluth. The grading on the branch of the road extending to the iron mines four miles north of La Prairie, Minn., is very nearly completed, and tracklaying will begin this week.

Eastern, Barnwell & Western.—The projectors are reported to have made considerable progress in securing right of way. Active work is being done along the projected route, and soon all the right of way will be secured. It is proposed to build from Augusta, Ga., to a point about six miles north of the city, and thence to some point on the Ashley River, near Charleston. By the new route the distance to Augusta will be 116 miles, which is 21 miles shorter than by way of Branchville.

Florence Northern.—Suit has been begun in the Circuit Court at Florence, Ala., by A. G. Negley, assignee of the North Alabama Construction Co., against the railroad for $164,352 for an alleged non-performance of contract. The survey has been completed for 70 miles and the road graded for 27 miles north of Florence, ready for the rails. The construction company claims that no payment has ever been made for the work done.

Florida Central & Peninsula.—Mr. Overton Barnard, of Tallahassee, Fla., has been engaged for the past week surveying a branch from the road west of Tallahassee, to connect the line with the La Pierre phosphate mines, which are about six miles west of Tallahassee and three or four miles from the railroad.

Fort Worth & Trinity.—The company filed its charter in Texas last week. The road will extend from Forth Worth to the north line of the state in Clay County, about 130 miles. The capital will be $2,000,000. The principal office will be at Fort Worth. The incorporators are: Martin Casey, C. K. Swasey, C. L. Frost, M. R. Kiley, Charles J. Larimer, all of Fort Worth, and James Craig, John F. Imel, C. R. Berry, J. R. Owens and S. S. Brown, of St. Joseph, Mo.

Georgetown & Granger.—John P. Hughes, of Fort Worth, Tex., who is building this road, reports the work progressing rapidly and likely to be completed Dec. 10 or a few days after. The tracklaying will probably be finished by the Missouri, Kansas & Texas, and the 12 miles of new road operated as a branch of that road, with which it connects at Georgetown, Tex.

Grand Trunk.—The double track work on the main line between Montreal and Toronto has been going on pretty continuously since the beginning of the year, with the result that 58 miles of additional second track has been placed in operation. At the close of last year the second track was in operation for 185½ miles on the 333 miles between Montreal and Toronto. The second track built this year is between Gananoque and Napanee, Ont., 43½ miles, and between Port Hope and Grafton, 14½ miles. About 28 miles of second track is now being graded, leaving a balance of 61 miles on which the double track work has not been commenced.

Great Northern.—The contract for building 80 miles of the Pacific extension between Puget Sound and the summit of the Cascade Mountains, has been let to Shepard, Henry & Co. of St. Paul, Minn. (This firm is composed of Shepard, Siems & Co., St. Paul; Henry & Balch, Minneapolis, and Larson & Co., of Helena.) The contract includes all the work on the western side of the range as far as the main tunnel at the summit. Starting from Everett, at the mouth of the Snohomish River, the route follows the left bank of the Snohomish to the main stream of the Skykomish River, thence up the south fork of the Skykomish to the Stevens Pass. Shepard, Siems & Co., of St. Paul, have 700 miles of this company's line east of the mountains, from Havre Junction, Mont., to the Columbia River, under construction. Grading on this will be nearly completed this year, and it is the intention to prosecute track laying all winter if the weather will permit. They have several tunnels already completed, ranging from a few feet to 1,325 ft. in length. On the 80 miles just let there is one tunnel 1,300 ft. in length. In order to pass the Cascade range a switchback will be constructed for use until a tunnel is bored. It has not yet been decided how high up the tunnel will be located, but present indications are that it will be 13,000 ft. long, as the difference in cost between that and the shorter one of 8,000 ft., would be saved in a few years in the reduced cost of operation. It is expected that the track will be laid into Kalispell in Missoula County, Mont., during the last week of this year. Owing to an accident on a bridge east of that point, a delay of a few days has been occasioned.

The Columbia River will be crossed in the vicinity of Wenatchee, but the exact location has not yet been fixed. There is a gap of 55 miles not yet contracted; when this is let the entire line necessary to complete the road between St. Paul and Puget Sound will be under construction.

The surveyors have located 19 miles of the extension of the Park Rapids line from that point toward Leach Lake, Minn. It is expected that the work will be pushed next summer.

Grading on the branch from St. Hillaire, south to Red Lake Falls, Minn., has been finished.

Houston & Texas Central.—Maj. B. M. Temple, Chief Engineer of the road, has begun the location of the extension of the Austin & Northwestern from Fairland, near Marble Falls, to Llano. The distance to Llano is only 31 miles.

Jacksonville, Tampa & Key West.—The work of widening the gauge on the Charlotte Harbor division south of Bartow, Fla., has now been completed for 24 miles to Arcadia where the work will be suspended for the season. The remaining 25 miles from Arcadia to Punta Gorda is still narrow gauge (3½ ft.) and will probably be changed next spring to the same gauge as the rest of the system, 4 ft. 9 in.

Kansas City, Watkins & Gulf.—C. H. Burton, Assistant Engineer, reports the pile driving and grading on the Northern division as progressing finely, and that the work will be completed to the crossing of the Texas & Pacific, near Alexandria, La., within 30 days. The company will soon resume tracklaying toward Alexandria. The rails are expected to arrive this week.

Kentucky Union.—T. W. Todd, of Clay City, Ky., the Chief Engineer of the railroad, has made a preliminary survey for a branch from Beattyville, Ky., to Lumber Point.

Lake Hopatcong, Boonton, Morristown, Caldwell & New York.—This railroad is being relocated from Caldwell to Rockaway, N. J., 17 miles, with a branch to Morristown, seven miles. H. C. Raynolds, Whippany, N. J., is Secretary, and C. C. Vermeule, 73 Broadway, New York, is Chief Engineer.

Lancaster & Hamden.—The work of construction is moving on very well and the entire line and branches into and through the coal, iron and oil fields will doubtless be fully completed Oct. 1, 1892, according to contract. The main line will be from Columbus, O., to Huntington on the Ohio River, 100 miles; Vinton branch and belt coal line 25 miles, then an extension via Lancaster to Laurelville in the Salt Creek Valley, 40 miles. At this point the lines join and extend through the coal, iron and oil fields of Hocking, Vinton and Jackson counties, O. About 60 miles from Columbus and 40 miles from Lancaster is situated Ash cave, with its cave, lakes and springs, largely owned by E. P. Buell & Co., and a company is being formed to develop a park. A large blast furnace will be erected here with a capacity of 250 tons of pig iron daily. Also a terra cotta works of large capacity. E. P. Buell & Co., of Lancaster, O., are the chief contractors.

Los Angeles Terminal.—The last tracklaying on the extension via Long Beach to East San Pedro, Cal., was completed in the latter part of November, and that line is now in operation, making the mileage of the company 51 miles. Three lines are in operation, as follows: From Angeles via Pasadena to Altadena, 16 miles; from Los Angeles to Verdugo, 8 miles, and the new line to East San Pedro, 27 miles. With the completion of the tracklaying on the San Pedro line construction work was suspended and the company does not propose to undertake the building of any other line until the summer of next year.

Mexican Central.—About 16 miles of track has been laid on the extension from Tula, a point on the main line north of the City of Mexico, in an easterly direction to

Pachuca, Mexico. The contract has been let to J. H. Hampson, of the City of Mexico, and the work will probably be completed by Feb. 1 next. The line is 72 kilometres long, about 44 miles.

Minneapolis Western.—This property was operated for the first time on Thanksgiving Day. The bridge across the Mississippi River at Minneapolis was completed some time ago and the track and approaches were all finished save a crossing of the Minneapolis Eastern, another switching company. An amicable arrangement has been effected between the two companies after numerous conferences, the details of which have not been made public. The Minneapolis Western affords the Great Northern direct trackage to the Minneapolis flour mills, and, while it is only a trifle over two miles in length, is an exceedingly valuable property.

Montgomery, Tuscaloosa & Memphis.—The company expects to have the grading on the entire line from Montgomery, northwest to Tuscaloosa, Ala., 106 miles, completed by Jan. 15 next; tracklaying will begin at once on the section between Montgomery and Maplesville, a distance of 50 miles. James M. Brown & Co., of New York, N. Y., and Montgomery, Ala., are the contractors.

Northern Pacific.—The track is about completed to Ocosta, Wash., and within a month the road will be in condition for operation, when trains will probably run through over the Gray's Harbor extension. Work will be continued during the winter on the extension to South Bend, Wash.

Norfolk & Western.—The work on the extension to Mount Airy, N. C., is to be recommenced at once, and probably most of the work remaining to be done will be finished by convict labor. This branch is in operation as far as Goshen, Va., near the North Carolina state line, and much of the line south of that town has been graded. The Cape Fear & Yadkin Valley has had its line in operation to Mount Airy for several months.

Odessa & Middletown.—S. Caporale & Co., of 20 Spring street, New York City, who have the contract for the grading on the four miles of road which it is now proposed to build between Odessa and Middletown, Del., still have a small force at work. The work now being done is on the heaviest fill of the line and the contractors are making good progress. The line is to be in operation Jan. 10, connecting at Middletown with the Delaware Valley road, one of the Pennsylvania lines. Extensions of the line both east and west are proposed and will probably be undertaken in the spring. The western extension will be nine miles long to Cecilton and Earlsville, and the line to the east will be seven miles long to Port Penn and St. Augustine. William R. Polk, of Odessa, is the Secretary and General Manager.

Old Colony.—A preliminary survey has been made for the proposed change of location of the tracks from South Wareham, west of Wareham Centre, Mass., near Boston, to the Narrows. By this change it is probable that in place of the Wareham Narrows and Parker Mills stations one union station will be the outcome.

Ottawa & Parry Sound.—Mr. Mountain, Chief Engineer of this railroad, with a staff of assistants, commenced the survey of the line from Albert Lake on Tuesday last. The survey will be continued to the Northern Railroad at Elmsdale, Ont.

Paducah, Tennessee & Alabama.—The extension from Paris is now graded, and bridges and trestles have been nearly completed to Hollow Rock, Tenn., the present proposed terminus. The track is being laid at an average rate of one mile a day and is now within 14 miles of Hollow Rock, which point it is expected to reach before Dec. 15. Junction and terminal facilities in connection with the Nashville, Chattanooga & St. Louis at Hollow Rock are under construction and will be completed about Dec. 20. No further extension of the road is contemplated before the spring of next year. Preliminary surveys will probably be made from Hollow Rock, Tenn., to Florence, Ala. The route is not yet determined.

Peninsula of Lower California.—W. Z. Earle, Chief Engineer of the railroad being constructed northward from San Quentin, Mex., to San Diego, Cal., and Yuma, says that the plans for the first 24 miles of road have finally been approved by the Mexican government, and work is to be pushed from now on. The steamer "South Coast" arrived in San Quentin last week with the last cargo of the contract for 50,000 ties and several hundred piles. About 200 men and teams are actively at work on the roadbed near San Quentin, and as soon as the southern section is completed will begin upon the line from the California State line, near Tia Juana, south of San Diego. This will be early in December.

Pennsylvania.—The City Council of Philadelphia has passed the ordinance to authorize the Roxborough Railroad to construct its road across and under the streets in the Twenty first and Twenty-second wards, from Germantown to the county line. An amendment that the company should bear the entire cost of abolishing grade crossings at all streets to be hereafter opened was defeated, and the ordinance which provides that the cost of constructing such crossings shall be borne half by the company and half by the city was passed finally. The expense of carrying the extension above or under all streets already opened is to fall entirely on the railroad. The Council committee has voted to approve the application of the company to build its Fort Washington branch from the Cresheim bridge, on the Chestnut Hill railroad, to the Montgomery County line, near Ivy Hill Cemetery.

Perry County.—About three miles of track has been laid beyond New Bloomfield on the extension of this line to Loysville and Landisburg, Pa. The extension is 11¾ miles long to Loysville, and has been graded the entire distance. The road will probably be bonded for $40,000, but the mortgage has not yet been recorded, as the trustees of the bonds have not yet been decided upon.

Philadelphia Northeastern Elevated.—The Board of Highway Supervisors of Philadelphia have granted permission to the company to proceed with the construction of its line on Front street, between Berks and Amber. The work will begin in a few days. The city authorities have accepted the second bond offered by the company for indemnity for any damages the construction of the line may cause the city. President Esler makes the following statement: The company has stopped work at Tacony for the present, but we are going to take it up elsewhere, the bond having been approved by the Mayor, and there is now nothing to hinder us going right ahead. All the surveying will be completed, but whether we shall be able to do much actual work on the building of the road this winter is doubtful. The Phœnixville Iron Works has the contract for furnishing the iron work, and will go right ahead getting it out. When we begin work it will probably be at Front and Norris streets. At the same time we shall take up the work at Tacony and work down from there. The route is all laid out and secured from Holmesburg down to League Island.

Philadelphia & Reading.—Plans have been completed for running the trains of the Philadelphia, Newtown & New York road into the new terminal station, at Twelfth and Market streets, Philadelphia, when that improvement is completed. The plans contemplate the building of a branch road, which will leave the tracks of the Newtown road east of Olney Station, and connect with the Tabor branch of the Reading Railroad near Logan Station. It will cross all intervening streets and the North Penn Railroad above grade.

Philadelphia & Reading Terminal.—J. J. Ryan & Co., of Philadelphia, the contractors for all the masonry work of the Terminal between Ninth and Wallace streets and Cherry street in Philadelphia, have also been given the contract for the masonry work of the trainshed between Arch and Cherry streets. Beyond clearing the space of buildings nothing has as yet been done upon it. Ryan & Co. are pushing vigorously the work of elevating Columbia avenue across the Reading tracks at Ninth street, for which they were recently given the contract.

Pittsburgh & Western.—The old track from the point where the new Ellwood Short Line commences to North Sewickley by way of Wurtemburg and Forest Grove, Pa., will probably be entirely abandoned. The completion of the short line, which has much easier grades and fewer curves, has left no necessity for keeping up the old line, and the rails are being taken up, and the bridges will be removed to other points on the road.

Portland & Rumford Falls.—The extension of 15 miles from Gilbertville west to Rumford Falls, Me., has been graded for over 10 miles, ready for the track. The contractors, James Mitchell and Parker Spofford, of Bucksport, Me., have until next July to complete the extension. Four short bridges with stone abutments and iron girders are being built. The stone work is more than half completed. The rails are to be laid in April and May next. The maximum grade is 80 ft. to the mile, and the maximum curvature is seven degrees. The new line is located along the north bank of the Androscoggin River, passing through the towns of East Peru, Peru, West Peru and Dixfield to Rumford Falls.

Puget Sound, Lake Washington & Eastern.—The company was incorporated in Washington last week with a capital stock of $1,000,000. J. T. Kingston, Jr., of Wisconsin and L. H. Rice, George Brackett, W. T. Chalk and L. D. Ross, all of Washington, are the incorporators. Their purpose is to construct a railroad from Edmonds, in Snohomish County, to a point in the eastern part of Washington near Spokane.

Quincy, Keokuk & Chicago.—The town of Quincy, Ill., has been asked to take $40,000 of the capital stock of this company, and a considerable sum has already been subscribed. The road is to extend from Niota, in Hancock County, to Quincy, in Adams County, Ill., along the east bank of the Mississippi River. The road connects at Niota with the Atchison, Topeko & Santa Fe, and the new line is said to be projected in the interest of that company. A committee of Quincy men, who recently went to Chicago to investigate this point, gives the following version of an interview with Judge Springer: Judge Springer officially assured the committee that the road, when built, would be run in the interests of the Santa Fe system exclusively, and that all stock in the road would be owned by the Santa Fe, excepting such as would be subscribed by communities along the line or by individuals.

Rockaway Valley.—The whole of the right of way has been secured for the Morristown extension of the road, and the work of construction will soon be started in Mendham, N. J., which is about seven miles west of Morristown.

Seattle & Montana.—The three branches controlled by the Great Northern, extending from Seattle, Wash., to South Westminster, B. C., are practically completed, and material trains have run through the entire distance. The date when regular trains will commence running will soon be made public, commencing with one train per day, each way.

Snowy Creek & Cranesville.—This railroad has recently begun operations between a connection with the Baltimore & Ohio near Terra Alta, W. Va., and Cranesville, W. Va., a distance of about 10 miles. The road is standard gauge and has been built to open up a tract of timber at Cranesville which is to supply wood pulp for paper mills. The connection with the Baltimore & Ohio is at Rinard, a point in Preston County, 1½ miles east of Terra Alta.

Southbridge, Sturbridge & Brookfield.—The engineers will probably start a locating survey for this road between Brookfield and Southbridge, Mass., this winter and the grading on the line will probably be commenced early next spring. Preliminary surveys have already been made by Arthur C. Moore, of Sturbridge, Mass. The road is about 13 miles long and will connect the Boston & Albany at Brookfield and the New York & New England at Southbridge, passing through Sturbridge. The first 10 miles of the road will be light grading in rock and gravel; the balance of the line will have a maximum grade of 66 ft. near a summit, but the ruling grade is low. There is one curve of seven degrees, but most of the curves are two and three degrees. There are two iron bridges, 100 ft. and 180 ft. long, and one trestle of 200 ft. The stock of the company has been subscribed to build the 13 miles and 10 per cent. has been paid in.

Tintic Range.—The track is reported laid beyond Goshen to within a few miles of Eureka, Utah, the proposed terminus. If the work is not interrupted the last track will be laid in a very few days. The delay of the work at Eureka has been ended by the purchase of the right of way which has been in dispute. There is a short tunnel at Eureka, and at Homansville pass is the heaviest work on the line.

Waterloo Junction.—The contractors have completed the construction work on this line, and it was opened for traffic last week. The formal transfer to the Grand Trunk, of which the line is a branch, will probably be made shortly. The road is an extension of the Waterloo Branch of the Grand Trunk, and is 11 miles long, extending from Waterloo to Elmira, Ont.

West Virginia Central & Pittsburgh.—The grading on the extensions to Beverly and Belington, W. Va., has been completed and the track will be all laid by Dec. 15. The extensions are 22 miles long, one mile being used by both lines. The Beverly line runs south from Elkins six miles, crossing the Tygarts Valley River with two Pratt truss iron bridges, one 247 ft. long, and the other 205 ft. There is a third bridge on the line, an iron girder, 40 ft. long. The Belington extension practically begins at the junction, about one mile south of Elkins, crosses the Tygarts Valley River with an iron Pratt truss bridge, and thence extends along the north side of the river, a distance of 16 miles to Randolph and Belington, the eastern terminus of the Grafton & Greenbrier. The maximum grade is 42 ft. a mile, and maximum curvature 12 degrees. The grading on both lines was light and the cost of construction will average about $11,500 a mile ready for the rolling stock. These lines, like other extensions of the company, were built by the company's own forces, and were not let out to contractors.

West Virginia & Pittsburgh.—Work on the extension of the road through Braxton County, W. Va., is progressing rapidly in spite of the cold weather of the past few weeks. A good portion of the work has been completed and Contractors Crogan and Fucia have completed their contracts beyond Laurel Creek and have moved their men upon the line to another contract. Contractor Blodgett has finished the stone work for the bridge across the Elk River and has moved to Laurel Creek, where he is at work on foundations for another bridge. Work is being rushed all through the line and it is hoped to have it completed by spring.

GENERAL RAILROAD NEWS.

Allegheny Valley.—A majority of the stock and bondholders of the company signed an agreement embodying the reorganization plan, which has previously been published. Messrs. R. D. Barclay, P. A. B. Widener and John B. Jackson were elected to buy in the road at the coming foreclosure sale.

Atchison, Topeka & Santa Fe.—The gross earnings, operating expenses (exclusive of taxes and rentals), and net earnings of the railroad and its auxiliary lines, for the month of October, were as follows:

	Gross earn.	Oper. exp.	Net earn.	Oper. mileage.
Railroads owned and controlled	$3,406,637	$2,106,257	$1,300,400	6,536
Roads jointly owned, Atchison's one-half	175,674	143,574	32,100	587
Total, Atchison system	$3,582,331	$2,249,831	$1,332,500	7,123
St. Louis & San Francisco:				
Roads owned and controlled	$770,061	$372,442	$397,619	1,329
Roads jointly owned, Frisco's one-half	172,004	135,966	36,038	536
Total, Frisco system	$942,065	$508,409	$433 657	1,865
Aggregate, both systems	$4,524,393	$2,758,239	$1,766,157	8,988

The following is a comparative statement of all lines:

	Gross earn.	Net earn.	Per mile. Gross earn	Per mile. Net earn.	Mileage.
Atchison System:					
Oct., 1891	$3,582,331	$1,332,500	$502.87	$187.05	7,123
Oct., 1890	3,358,882	1,205,789	472.46	169.61	7,109
Increase	$223,448	$126,711	$30.41	$17.44	14
Frisco System:					
Oct., 1891	$942,065	$433,676	$505 30	$232.60	1,864
Oct., 1890	868,656	358,439	468 18	193.19	1,855
Increase	$73,409	$75,217	$37.12	$39.41	9
Aggregated General System:					
Oct., 1891	$4,524,396	$1,766,157	$503.38	$196.50	2,988
Oct., 1890	4,227,538	1,564,229	471.58	174.49	8,965
Increase	$296,858	$201,928	$31.80	$22.01	23

Baltimore & Drum Point.—Thomas Hughes and S. Johnson Poe were this week appointed receivers of this railroad. The proceedings for the appointment of receivers were instituted by Mr. Hughes as counsel of the late Henry E. Loane. It is reported that a syndicate of capitalists has been formed to purchase and complete the road when it is sold at auction as directed by the court.

Boston & Maine.—The statement of the operations for the quarter ending Sept. 30, and for the fiscal year ending on that date, is as follows:

Three Months—July 1 to Sept. 30.

	1891.	1890.	Inc. or dec.
Gross earn	$4,421 761	$4,563,768	I. $142,007
Oper. expenses	2,724,924	2,824,344	I. 99,420
Net earn	$1,696,837	$1,739,424	I. $42,587
Other income	150,888	130,194	D. 20,694
Total net earn	$1,847,725	$1,869,618	I. $21,893
Fixed charges	968,051	977,586	I. 9,535
Balance	$879,661	$892,032	I. $12,358

Twelve Months—Oct. 1 to Sept. 30.

	1890-91.	1889-90.	Inc. or dec.
Gross earn	$15,240,513	$15,124,388	I. $106,125
Oper. expenses	9,984,079	9,836,066	I. 148,013
Net earn	$5,256,434	$5,298,322	D. $41,888
Other incomes	385,824	[illegible] 809	I. 20,015
Total net	$5,642,258	$5, 4,131	D. $21,873
Fixed charges	3,969,051	4, 17,838	D. 147,787
Balance	$1,782,207	$1,67 .293	I. $125,914

Baltimore & Ohio.—The passenger trains of this road began running into the Grand Central station in Chicago, on Dec. 1, and hereafter all the passenger trains will use that station instead of the Illinois Central on the lake front. The station will be occupied jointly by the Baltimore & Ohio, the Wisconsin Central and the Chicago, St. Paul & Kansas City companies. On reaching the station the trains of the Baltimore & Ohio will use the tracks of the Wisconsin Central from South Chicago. The agreement with the Wisconsin Central for the joint use of this station provides for the payment by the Baltimore & Ohio of 1.09 per cent. on the five per cent. bonds of the Chicago & Northern Pacific Co., which owns the station.

Baltimore & Ohio Southwestern.—The directors have issued a statement of the earnings since the reorganization. For the 12 months to Dec. 31, 1890, the gross earnings were $2,329,445, and the net income $811,652, out of which taxes, fixed charges and a dividend of four per cent. upon first income bonds were paid. These earnings up to the end of the fiscal year, June 30, 1891, have been supplemented as follows: Additional gross

earnings, $1,088,671; additional net earnings, $371,817, leaving net, after paying taxes and fixed charges, $98,999. The ten months' operation of the road from Jan. 1, 1891, to Nov. 1, as estimated, is $2,050,892, as against $1,939,335 for the corresponding period last year. After payment of the operating expenses there is a net earning of $769,203, as against $678,333, and after deducting fixed charges and taxes there is an approximate net income of $303,099, as against $212,570. At this rate it is believed that the net earnings for the present year will be about $900,000.

Central of Georgia.—Holders of $1,000,000 six per cent. bonds of the Ocean Steamship Co., of Savannah, Ga., due Jan. 1, 1892, are notified that the company has executed a mortgage to the Central Trust Co., of New York, on ships and terminals in Savannah, Ga., to secure an issue of $1,000,000 first mortgage five per cent. gold bonds, due July 1, 1920, having the guarantee of principal and interest by the Central Railroad and Banking Co., of Georgia. Holders of maturing six per cent. bonds can exchange them for the new five per cents. on a basis of bond for bond and a cash payment of $5, and over one-third have been so exchanged.

Central of New Jersey.—The company reports gross earnings for October of $1,408,412, an increase of $65,434 as compared with the same month of last year, and net earnings, $677,154, an increase of $10,103. For the 10 months ending Oct. 31 the gross earnings were $11,824,888, an increase of $569,352 as compared with the corresponding period of last year, and net earnings, $5,064,899, an increase of $241,687.

Chicago, Burlington & Quincy.—The company reports gross earnings for October of $3,880,730, an increase of $357,677 as compared with the same month of last year, and net earnings of $1,659,004, an increase of $51,399. For the 10 months ending Oct. 31, the gross earnings were $28,286,787, a decrease of $1,155,386 as compared with the corresponding period of last year, and net earnings, $10,768,461, an increase of $423,643. Fixed charges for the 10 months were $7,925,000, an increase of $216,844, leaving a surplus of $2,816,491, an increase of $206,798 over last year.

Chicago, Milwaukee & St. Paul.—The statement of earnings and expenses for October shows gross earnings of $3,476,656, an increase of $570,885 as compared with the corresponding month of 1890. The operating expenses were $1,904,632, an increase of $174,852, and the net earnings were $1,572,024, an increase of $396,033. For the four months ending Oct. 31, the gross earnings amounted to $11,246,823, an increase of $1,174,668; operating expenses, $6,964,716, an increase of $488,910; net earnings, $4,282,106, an increase of $665,757.

Cincinnati, Jackson & Mackinaw.—The representatives of the junior mortgage bondholders who bought the middle division of the railroads at the recent foreclosure sale failed to pay the second installment of $100,000 on Dec. 1, and accordingly they forfeited their right to the road, losing the first deposit of $15,000. This division will now be resold, and the Reorganization Committee will have a chance to purchase it as it already has bought the northern division. Thereupon the lease to the Cincinnati, Hamilton & Dayton may be executed as arranged.

East Tennessee, Virginia & Georgia.—The gross earnings of this railroad, including Knoxville & Ohio, for October, were $704,589, an increase of $509 as compared with the same month of last year, and net earnings were $240,879, an increase of $744,992. The Memphis & Charleston reports gross earnings for October of $157,462, a decrease of $2,949 as compared with the same month of last year, and net earnings of $60,865, an increase of $15,456.

International & Great Northern.—Maj. Ira H. Evans, of Austin, Tex., who was appointed one of the receivers of the company by the United States District Court, filed bonds at Galveston last week. The first bond is in the suit brought by the trustees of the first mortgage bondholders, and the second bond is in the suit of the Farmers' Loan & Trust Co., trustee of the second mortgage bondholders, who brought suits in the United States Court and at Tyler to have the road taken out of the hands of the Texas State Courts and placed under the jurisdiction of the Federal Court.

Louisville & Nashville.—The gross earnings for October were $1,963,028, an increase of $174,108 as compared with the same month of last year, and net earnings were $744,648, an increase of $13,347. For the four months ending Oct. 31 the gross earnings were $7,448,979, an increase of $742,208 as compared with the corresponding period of last year, and net earnings $2,776,886, an increase of $222,939.

Manhattan Elevated.—The Park Commissioners of New York have denied the application made to them to revoke the permit granted in 1876, which authorized the construction of the elevated roads along the north and east sides of Battery Park to reach the ferries at the south end of Manhattan Island. The commissioners did not believe that any weight should be attached to the statement in the petition demanding the ejectment of the elevated railroad, that the value and usefulness of the park were destroyed by the elevated structure. Certainly the discomfort which would be caused to about 6,000 000 passengers, by an order stopping the running of trains through the park was far greater than any injury done to the park by the elevated road.

Missouri Pacific.—The railroad reports gross earnings for October of $2,752,137, an increase of $298,675 as compared with the same month of last year, and net earnings of $1,130,772, an increase of $369,042.

New London Northern.—The railroad was leased this week at a special meeting of stockholders at New London, Conn., to the Consolidated road of Vermont, for 99 years by a vote of 12,000 stockholders out of 15,000 of the Consolidated.

Oregon & Washington Territory.—It is reported upon credible authority that arrangements are almost complete for the transfer of this road in Eastern Oregon and Washington, also known as the Hunt system, to the Northern Pacific. Charles B. Wright, who purchased the road last spring, is expected to turn it over to the Northern Pacific about Jan. 1, taking bonds in payment. The Northern Pacific will receive the entire capital stock of the Hunt system for guaranteeing the principal and six per cent. interest on the bonds that are to be issued at the rate of $25,000 per mile.

Richmond, Nicholasville & Beattyville.—In the United States Court in Louisville, Ky., Dec. 2, on complaint of the Central Trust Co., of New York, and other creditors, This railroad was placed in the hands of a receiver, John McLeod, of Louisville, being appointed to act in that capacity.

Richmond & West Point Terminal.—At a meeting of the directors this week, a committee was appointed for the settlement of existing questions in the management and finances of the company. The committee consists of E. Norton, ex-President of the Louisville & Nashville; Jacob H. Schiff, W. Solomon, of Speyer & Co.; ex-Secretary Fairchild, President Fitzgerald, of the Mercantile Trust Co., and F. P. Olcott, President of the Central Trust Co. This committee was appointed under a resolution which defined its duties as "to carefully inquire into the management and condition of the Terminal properties and to aid the company in approving the best plan for the permanent adjustment of its affairs." The resolution provides for the continuance in office of the present management pending the preparation of a reorganization scheme and another election of officers. The directors issued a circular explaining the reason for appointing this committee. They explain that owing to the financial depression "the company has been unable to sell securities based upon engagements they had made prior to the period of depression and to pay for necessary equipment and improvements. A large floating indebtedness has in this way been created, but each of our important railroad systems is solvent and they have in their treasuries a large amount of securities. The Terminal company owes no floating debt whatever. After maturely considering the whole situation we felt it wise to invite the gentlemen whose names appear (are given above) to aid us in perfecting the best plan for a permanent adjustment of our affairs. . . The railroads comprising the Terminal system are very valuable, and under a wise and conservative plan for paying their floating debts, providing a sufficient fund for equipment and betterments and of more perfectly consolidating their operations, their earnings can be increased and a higher range of values established for all lines of your securities."

St. Lawrence & Adirondack.—An official inspection of the Canadian section of the road from Valleyfield, Que., to Malone, N. Y., has been completed. The line will be opened for traffic in a fortnight.

Texas Central.—The committee of first mortgage bondholders last week filed in the county court at Waxahachie, Tex., to-day a chattel mortgage to the Ohio Falls Car Co. for $49,000, to secure new rolling stock, as follows: Ninety box cars, one passenger car, one officers' car, one combination car and four cabooses.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Dec. 2, 1891.

The Commissioners of the Western Traffic Association have issued a notice to members in regard to the payment of commissions on westbound immigrant traffic to Pacific coast points. In August last the Southern Pacific gave notice of intention to withdraw from the immigrant commission agreement of the Trans-Continental Association, alleging that other lines were paying $13 commission from New York to the Pacific coast on this class of traffic. The company was induced, however, before taking that step, to refer the matter to the commissioners of the Western Traffic Association, and they, after investigation, on Oct. 22 authorized the Southern Pacific to participate in a commission of $13 on this business via New Orleans, the proportion west of that point not to exceed $8, in order to equalize that route with commissions paid by the Delaware, Lackawanna & Western, and the New York, Ontario & Western in New York City on traffic routed via Chicago and Kansas City. Thereupon the Atchison, Topeka & Santa Fe applied for similar relief, on the ground that some of the lines via Chicago were participating in this unauthorized commission. In investigating this matter, the commissioners were met by the claim of some of the lines that there was no commission agreement in effect on immigrant trans-continental business. Upon this point they now rule that such an agreement was entered into in the Trans-Continental Association on Dec. 31, 1890, which became part of the agreement of the Western Traffic Association, organized in January, 1891. They therefore order that the payment of commissions on this traffic westbound shall not exceed $3 west of Chicago and St. Louis, and $2 west of the Missouri River, the same as provided by the agreement, and call upon all lines to enforce the same without deviation and "to immediately cease and desist from any variation therefrom." Believing that this order will accomplish the object had in view when the temporary relief was granted to the Southern Pacific, that relief is withdrawn. In conclusion they state that "this decision is without prejudice to the continuance of the investigations now in progress in respect to alleged payment of excessive commissions in contravention of the agreement."

The Central Traffic Association at last week's meeting failed to prevail upon the Chicago Grand Trunk to discontinue the payment of cartage and switching charges, and it was decided to call a meeting of the Joint Committee in New York this week. Geo. B. Spriggs resigned the chairmanship of the special eastbound committee, and the committee was reorganized with Geo. B. Reeve as chairman and the former members again consented to become active.

There are persistent rumors afloat that the Burlington is about to resume the payment of commissions in Eastern territory on the ground that it is not receiving the fair share of the business guaranteed to it by the Board of Rulings.

The Rock Island has filed complaints with the chairmen of the Western Passenger and Transmissouri Associations accusing the Burlington of manipulating the $15 fare from Kansas City to Cincinnati via Chicago, and of selling round-trip tickets from Denver to Chicago and return in violation of agreement.

Chairman Midgley and Mr. G. L. Carman, Superintendent of the Weighing Association, have been subpœnaed to testify before the grand jury at Omaha, but it appears that the investigation of illegal rate cutting which was begun there this week has been postponed until the next term of the court, owing to inability of the officers to find important witnesses.

The presidents of the important roads met yesterday and discussed the possibility of curtailing the issue of free passes after the end of this year. Vice-President McMullin, of the Chicago & Alton, was made chairman of a committee to further consider the subject, the attendance at this meeting not being sufficient to warrant decisive action.

Division of Traffic on the Southwestern Roads.

A railroad officer in Chicago sends us the following explanation of the reports recently published concerning irregularities in the traffic reports sent to Chairman Walker:

The eight roads known as the Southwestern lines, operating between the Missouri River south of Rulo, Neb., and points east of the Mississippi River, have for the last 15 months had in effect an arrangement for the apportionment of their traffic upon a basis to be determined by Chairmen Walker, Midgely, Faithorn and Finley. Diversions of business have occasionally been requested by the Commissioners from one line to another in order to keep the movement of freight upon an approximately fair basis in view of the conditions and strength of the various lines. While these diversions have not been large in comparison with the aggregate volume of the traffic, they have served to assist in maintaining a steady condition of rates upon that traffic, which was previously subject to great contention and caused frequent charges of manipulation. The complaints of violation of the law which have recently been investigated by United States grand juries at St. Louis and elsewhere relate either to transactions prior to the formation of this agreement or to traffic not included under it.

From the beginning, however, the Commissioners were embarrassed by the fact that the system employed in collecting statistics did not embrace the entire movement subject to the agreement. Such statistics have been kept for many years by the lines in question and compiled in the office of the Southwestern division of the Western Freight Association. Approximate statements have been issued weekly and revised statements monthly, after checking the approximate statements with the books in the offices of the various auditors. These final corrections have been so great as to seriously embarrass the Commissioners and have given rise to misunderstandings. The approximate statements have frequently been published in the newspapers with percentages calculated thereon which have always been quite misleading, and the Commissioners have regarded them as practically useless. The omissions have no doubt been unintentional and have arisen from the impossibility of furnishing accurate weekly statements of the traffic, much of which is received from connecting lines and does not originate with the lines in question. The Commissioners have recently called attention to the comparative worthlessness of the weekly statements, and their issue will probably be suspended for the present.

Traffic Notes.

The Wabash has announced that demurrage rules will be put in force at all stations after Jan. 1.

A meeting of Central Traffic lines will be held Dec. 10 to consider the abolishment of second class passenger rates. It is said that all the strong lines favor the move.

During October the Southern Pacific lines carried east 46,907 tons of through freight. Of this 13,686 tons went from San Francisco, 9,695 tons from Sacramento, 8,538 tons from Stockton, 5,057 tons from Los Angeles. Over 8,000,000 lbs. of canned goods went from upper California points.

The Trunk and Central traffic lines discontinue the use of tourist (second class) sleeping cars from Dec. 1. This business was mostly done by the roads through Canada, the only other line being a weekly car between Boston and Chicago over the Fitchburg, the Delaware & Hudson and the Erie.

The Atlantic Transport Line will, beginning on Jan. 2, load vessels at Philadelphia direct for London. This line was established several years ago for the purpose of carrying freight between London, Swansea, Philadelphia and Baltimore. The ships have hitherto gone to Baltimore to load eastbound cargoes.

The memberships in the California Traffic Association are classified, so that individuals and firms doing a heavy business will pay proportionately higher dues than the great majority of members. Those in class A pay $150 a year. About 150 firms have already signed the agreement as members of this class.

Mr. Julius Kruttschnitt, General Manager of the Southern Pacific at New Orleans, speaking of the effect of the Texas commission rates on the Southern Pacific, said he had not yet reached any definite conclusion. Statistics have not yet been made up. The new rates have forced the traffic to move in new directions, and that necessitates the striking of a balance. The Southern Pacific may get new business through the commission rates to offset the business which the road has certainly lost. A reduction of from 10 to 20 per cent. has been made on all the commodity tariffs. Mr. Kruttschnitt did not think that the new tariff had had a particle of effect on Galveston.

Among the other railroad officers complained of by the Interstate Commerce Commission lately is Peter H. Wyckoff, General Freight Agent of the Central of New Jersey, who was arrested in New York Nov. 25, upon an indictment found by the United States Grand Jury of the Eastern Judicial District of Missouri, on Oct. 31, charging him with violation of the Interstate Commerce law. The Central of New Jersey, the Wabash, the New York, Chicago & St. Louis, the Philadelphia & Reading and the Delaware, Lackawanna & Western participated in a shipment of locomotive brakes from East St. Louis to Philadelphia July 2, 1890, on which the tariff rate was 38½ cents per 100 lbs.; and the charge is that the American Brake Co. was allowed a rebate, and only charged 31½ cents per 100 lbs. Mr. Wyckoff was released on $500 bail furnished by Loyal Farragut. F. W. Fowkes, of the Philadelphia & Reading, has been arrested on a similar charge. Both men say the alleged irregularities occurred on the initial line.

Eastbound Shipments.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Nov. 28 amounted to 73,252 tons, against 76,849 tons during the preceding week, a decrease of 3,597 tons, and against 70,892 tons during the corresponding week of 1890, an increase of 2,360 tons. The proportions carried by each road were:

	Wk. to Nov. 28.		Wk. to Nov. 21.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	10,673	14.0	11,022	15.0
Wabash	4,910	6.2	4,898	6.7
Lake Shore & Michigan South.	10,558	13.8	13,038	17.8
Pitts., Ft. Wayne & Chicago	7,546	9.9	7, 00	10.8
Pitts., Cin., Chicago & St. L	8,279	10.8	6,059	8 3
Baltimore & Ohio	5,223	6.6	4,591	6.3
Chicago & Grand Trunk	10,973	14.3	9,216	12.6
New York, Chic. & St. Louis	9,181	12.0	8,311	11.3
Chicago & Erie	9,506	12.4	8,217	11.2
Total	76,849	100.0	73,252	100.0

Of the above shipments 3,603 tons were flour, 38,178 tons grain, 2,195 tons millstuff, 4,666 tons cured meats, 8,561 tons dressed beef, 1,962 tons hides and 3,597 tons lumber. The three Vanderbilt lines carried 44.1 per cent. of all the business, and the two Pennsylvania lines carried 19.1 per cent. The lake lines carried 56,802 tons, against 86,987 tons during the preceding week.